ARCOMA

Installation and Service Manual

Arcoma Intuition

CE 2862

Doc.No.: 2000-095-002-EN Rev. 2.1

Revision

Reason for change	Rev	Date
First release	1.1	2021-10
Updates in accordance with MDR	2.1	2023-05

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1 Introduction

1.1 Document Information

- It is important to keep this document for the life of the equipment, and pass the document on to any subsequent holder or user of the equipment.
- The original version of this manual is written in English.
- Training is provided by or via your sales representative. Training material consists of the Operator's Manual and the Installation and service manual.

1.1.1 System Documentation

The following documentation is available for the system:

- Intuition System installation and service manual
- Intuition System operation manual
- Intuition System planning guide
- Image system service manual
- Image system user manual
- Detector user's manual

1.1.2 Stylistic Conventions

All warning label texts are shown in *italic* style in this manual.

All references are shown in *italic* style in this manual.

1.1.3 Document Producer

This document has been produced by:

Arcoma AB
Annavägen 1
S-352 46 VÄXJÖ, Sweden

www.arcoma.se

1.1.4 CE Marking

Detectors and x-ray chain are not included in the CE marking of this device, but holds its own CE marking by Canon Inc. These components are combined under Article 22 of MDR 2017/745 EU in a manner that is compatible with the intended purpose of these devices and are subject to internal monitoring, verification and validation by Arcoma AB.

1.1.6 Text Emphasis

WARNING!

All texts labelled with "WARNING" call attention to potential risk to health or life.

CAUTION!

All texts labelled with "CAUTION" contain information about dangerous situations and measures to avoid risk.

Note!

All texts labelled with "NOTE" contain additional information regarding the work step, and is provided for a better understanding or as a warning about unnecessary and avoidable difficulties.

1.2 Identification Labels

The figure shows the location of the identification labels on the equipment.

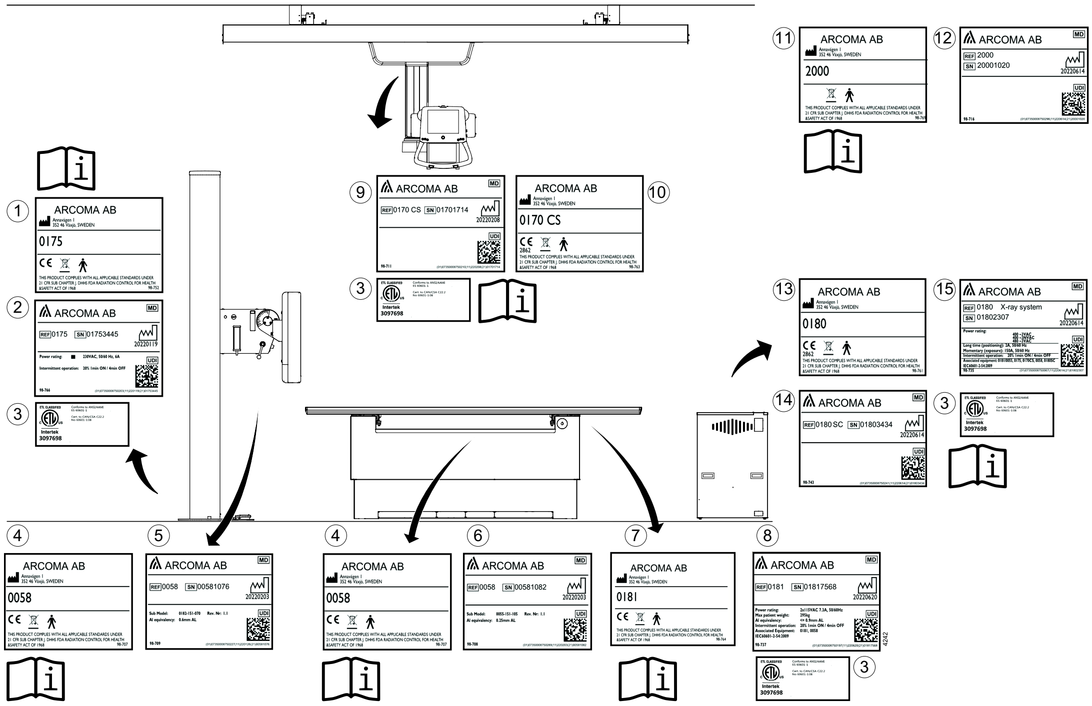

Fig. 1-1

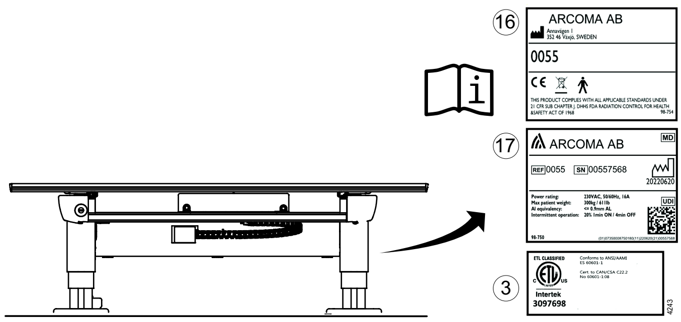

Fig. 1-2

Introduction
Identification Labels

Table 1-1 . Identification Labels

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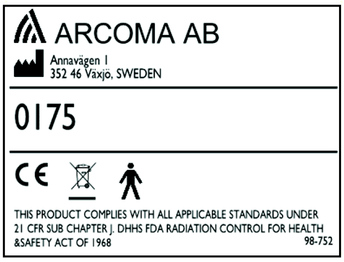
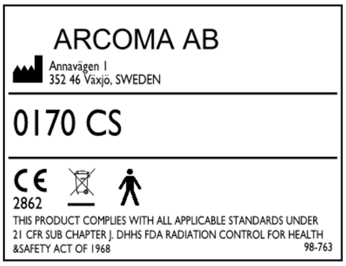
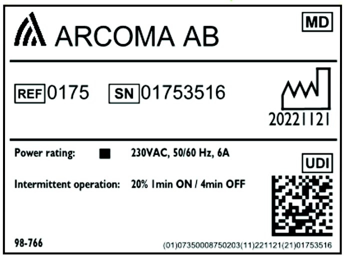
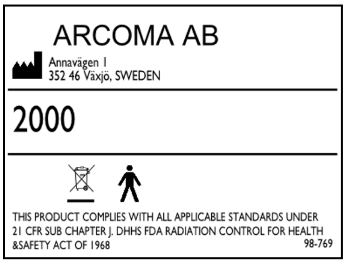
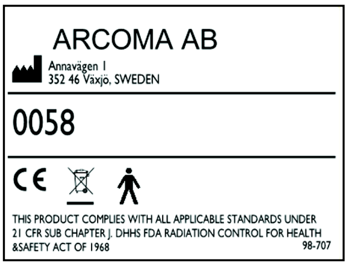
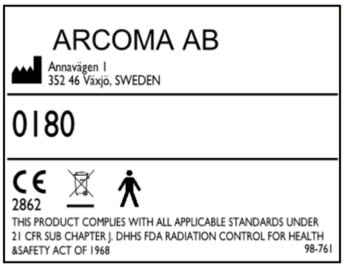
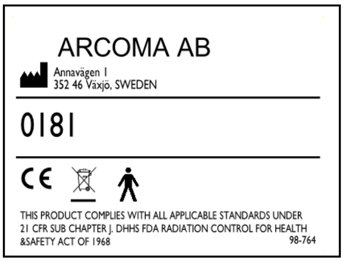
1		10	
2		11	
3		12	
4		13	
5		14	

No **Label**

6

7



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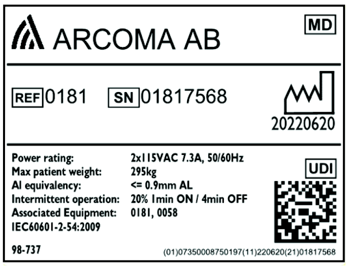
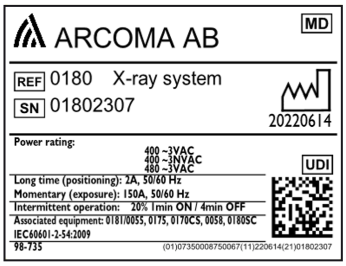


9

No **Label**

15



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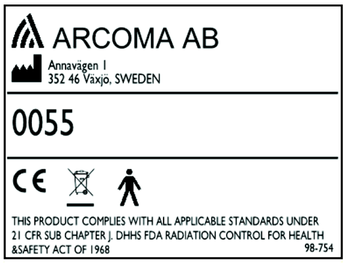

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1.3 System description

1.3.1 Intended Use

Stationary X-ray device intended for obtaining radiographic images of various portions of the human body in a clinical environment.

The system is not intended for mammography.

1.3.2 Intended Users

The intended user of the X-ray system is a radiographer (technologists).

Radiographers mostly schedule, prepare, perform, and finalize X-ray examinations. The Radiographer must be able to physically operate the system. This includes sufficient capabilities in hearing, vision, and mobility.

In some cases, or countries, the X-ray system is operated by especially trained nurses or doctors.

Minimum skills are knowledge in:

- Westernized Arabic numerals
- General radiographic positioning and procedures
- Anatomy
- Radiation protection
- Hygiene and basic infection control

The detailed qualifications required to operate an X-ray system are defined by local legal regulations.

1.3.3 Patient Target Group

- Age: Newborn to geriatric
- Patient Weight: 0-300 kg
- Health: Patients vary from healthy to affected by multiple traumas.

Special attention shall be given to the patient dose when the device is used for new-born patients.

1.3.4 Expected Clinical Benefits

The major clinical benefit for the patient is the possibility to undergo safe radiologic examination, the results of which may contribute to diagnosis of injury or disease, or follow-up of therapy. The x-ray examination as such is rarely the sole factor to determine patient management, but several parameters contribute. Thus, clinical outcome cannot be directly correlated with Arcoma Intuition, but has to be related to the overall benefit of diagnosis.

1.3.5 System overview

The system may be configured in several different versions with a base consisting of an image system, a cabinet and an overhead tube crane. Starting with the base system, there are possible options to include a wallstand and/or a table.

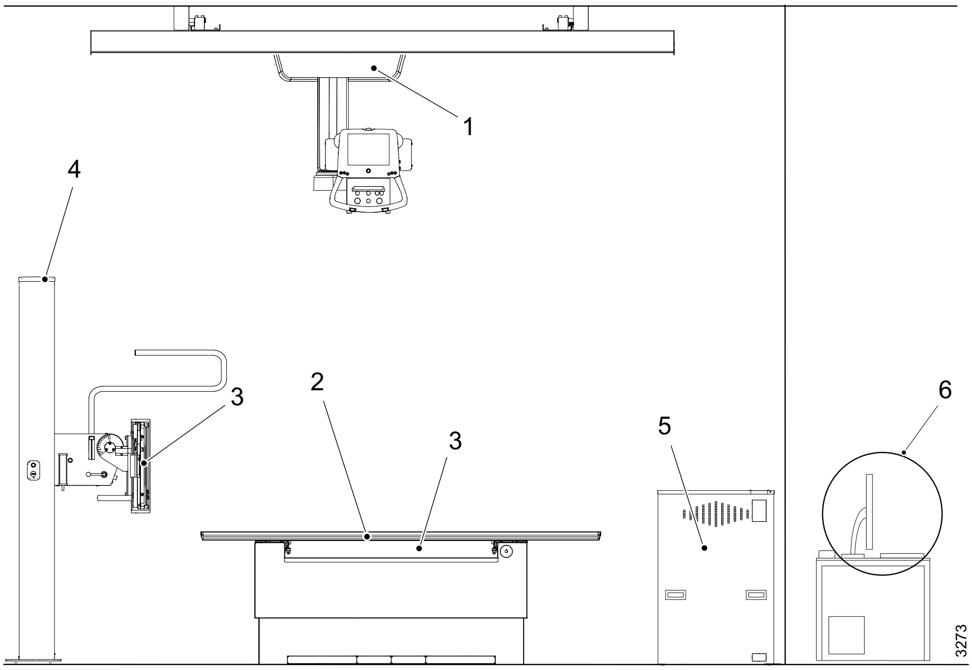


Fig. 1-3 Main parts

1. Overhead tube crane, OTC
2. Closed table or two column table (option)
3. Detector holder
4. Wallstand
5. Cabinet
6. Image system PC

1.3.5.1 Overhead Tube Crane Overview

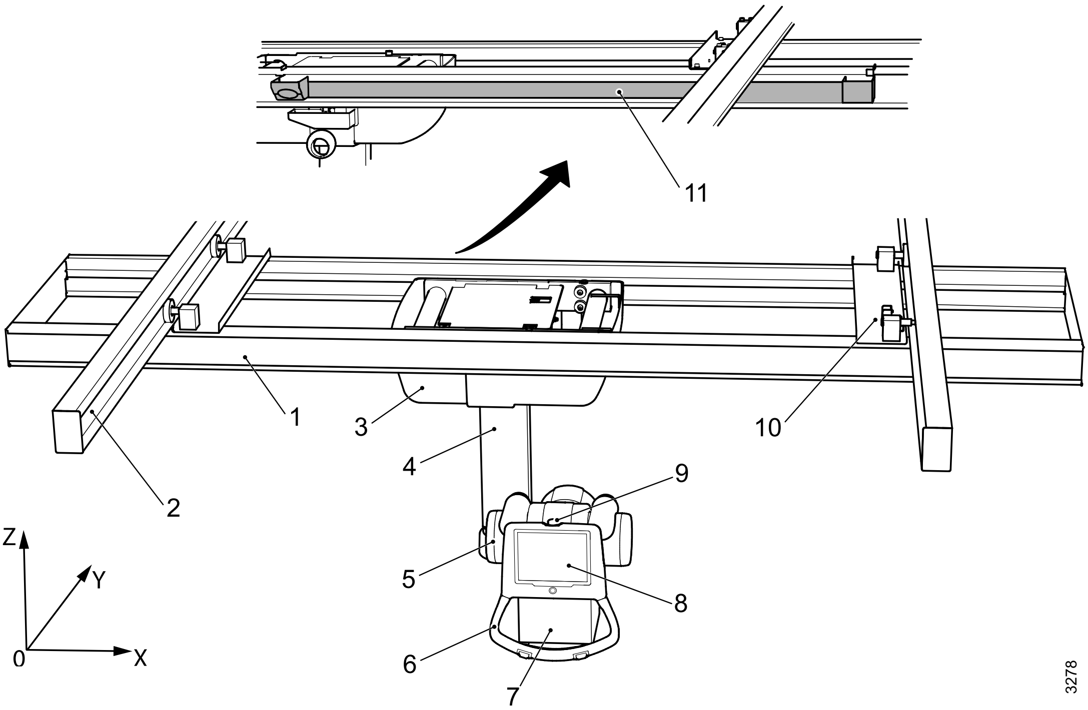


Fig. 1-4 Overview

1. *Traverse rail (X)*
2. *Ceiling rail (Y)*
3. *Ceiling wagon*
4. *Column (Z)*
5. *X-ray tube*
6. *Manoeuvre handle*
7. *Collimator*
8. *Display*
9. *Emergency stop*
10. *Distance plate and brake*
11. *Cable channel*

1.3.5.2 Table

Closed table

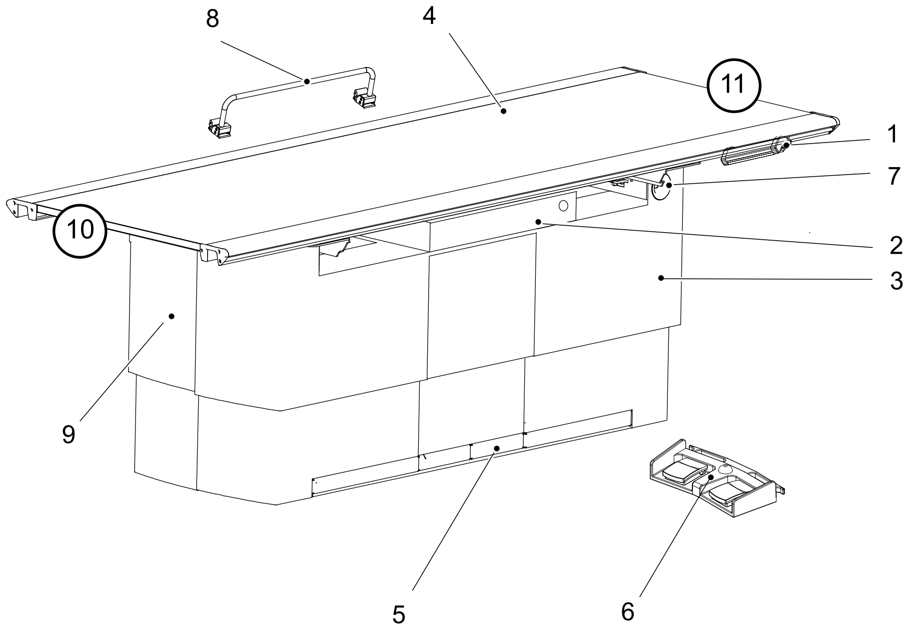


Fig. 1-5 Closed table

1. *Manoeuvre hand control (option)*
2. *Detector holder*
3. *Vertical lift*
4. *Table top*
5. *Kick box control*
6. *Foot control (option)*
7. *Emergency stop*
8. *Patient hand grip (option)*
9. *Brake release button for detector holder*
10. *Head end*
11. *Foot end*

Models and designs

The table is prepared for different types of detectors, fixed or portable in different sizes.

Two Column Table (option)

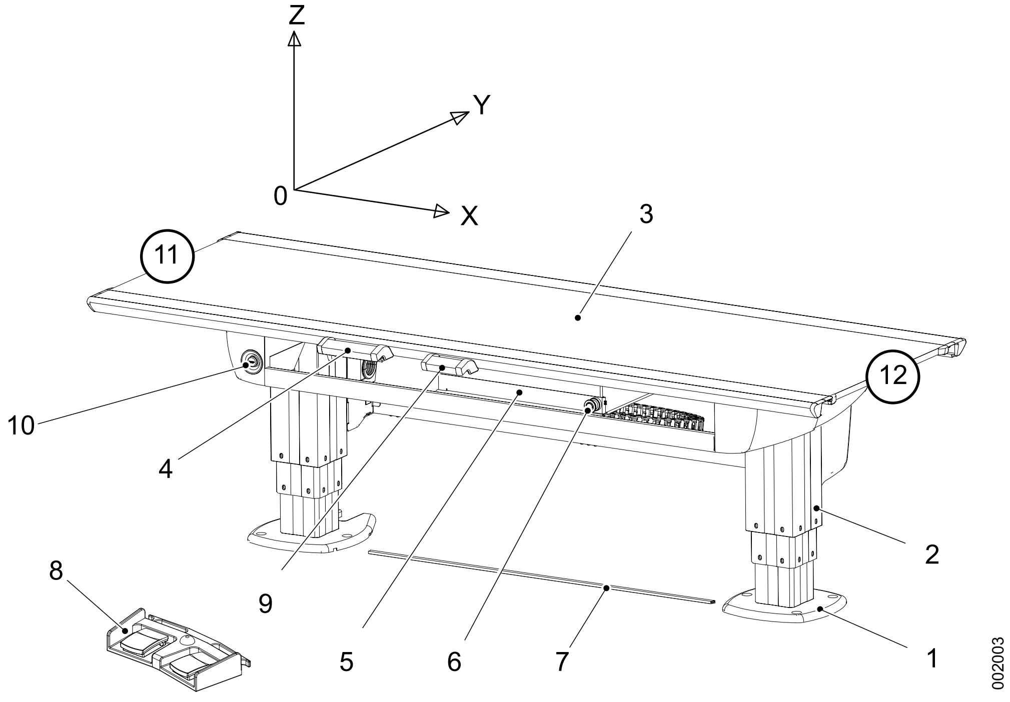


Fig. 1-6 Two column table with manual detector movement

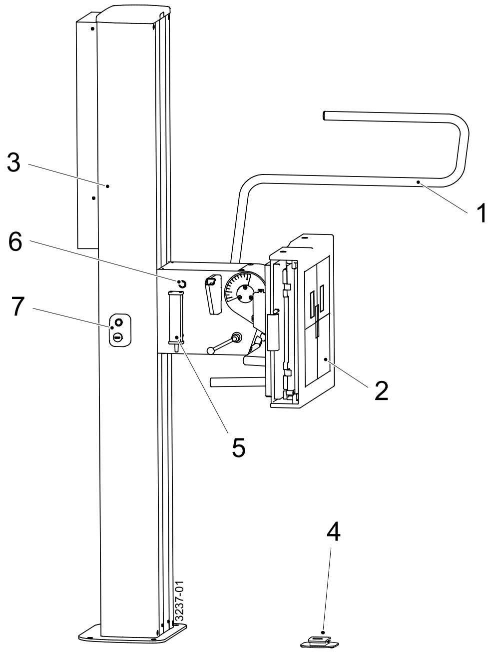
1. *Foot plate*
2. *Column*
3. *Table top (X/Y/Z)*
4. *Table hand control (X/Y/Z)*
5. *Detector holder*
6. *Brake release button for detector holder*
7. *XY foot control strip type (option)*
8. *Foot control table (X/Y/Z) (option)*
9. *Collimator hand control (option)*
10. *Emergency stop*
11. *Head end*
12. *Foot end*

Models and Designs

The table is prepared for different types of detectors, fixed or portable in different sizes.

1.3.5.3 Wallstand Overview

The figure shows the main parts of the wallstand.



1. Lateral armrest
   (Accessory)
2. Imaging unit
3. Column
4. Standard Foot control (Brake release for manually moving the detector holder up/down)

   Optional Foot control (Motorized movement; Z-movement up and down and brake release)
5. Hand control for collimator control (Option)
6. Brake release button for manually moving the detector holder up/down
7. Sync button and emergency stop

Fig. 1-7 Wallstand Overview

Models and Designs

The wallstand has different options:

- Tiltable detector holder wagon.
- Motorized Z movement.
- Prepared for different types of detectors; fixed or portable in different sizes.
- The detector/receptor holder for the portable detector is available for either left-hand or right-hand loading.

2 Safety

2.1 Compliance

External equipment intended for connection to signal input, signal output or other connectors shall comply with the relevant product standard e.g. IEC 60950–1 for IT equipment and the IEC 60601–series for medical electrical equipment.

In addition, all such combinations – systems – shall comply with the safety requirements stated in the general standard IEC 60601–1, edition 3.1, clause 16. Any equipment not complying with the leakage current requirements in IEC 60601–1 shall be kept outside the patient environment, i.e. at least 1.5 m from the patient support.

Any person who connects external equipment to signal input, signal output or other connectors has formed a system and is therefore responsible for the system to comply with the requirements.

If in doubt, contact qualified medical technician or your local representative.

If external equipment is connected, an isolation device is needed to isolate the equipment located outside the patient environment from the equipment located inside the patient environment. In particular such a separation device is required when a network connection is made. The requirements on the separation device is defined in IEC 60601–1, edition 3.1, clause 16.

2.2 Precautions, safety

WARNING!

No modification of this equipment is allowed.

WARNING!

The equipment is intended for use in radiographic examinations under the guidance of trained health care professionals. Operating personnel must be familiar with the equipment and the instructions given in this manual before using the equipment.

WARNING!

Safety devices must not be removed or modified. Any modification or removal will immediately impair the safety.

WARNING!

All motorized movements shall be supervised by trained personnel.

WARNING!

Do not use non-medical electrical devices in the X-ray room.

WARNING!

Do not use this device if you see smoke or notice unusual odors or noises.

If smoke, unusual odors or noise are being generated, continued use of this product may result in fire.

Turn OFF the power source breaker immediately, unplug the device, and contact your nearest service representative. Do not attempt to repair it.

WARNING!

Risk of electrical hazard or damage to the system

- ***Before cleaning or disinfection, switch off the system to prevent electric shocks, for exceptions see 2000-095-022 Arcoma Intuition Operation Manual.***
- ***Do not spray or pour cleaning liquid on any part of the system.***

  Use a lint-free cloth moistened with a moderate amount of liquid to avoid that cleaning liquids seep into the openings of the system, e.g., air openings, gaps between covers.
- ***Do not restart the system if cleaning liquids have leaked in.***

CAUTION!

Do not use any flammable or explosive gases near the device.

CAUTION!

Before using this device, read the manuals supplied with the devices in order to understand functions, operation, and performance. Follow the manuals for correct procedures.

CAUTION!

Before using the device again after a longer period of time, check the correct operation of the system.

CAUTION!

The system is provided with air intakes and outlets to prevent the equipment from overheating. Do not block these air intakes and outlets.

CAUTION!

Handle loose objects with care, so they will not fall down on patient or at the surrounding articles.

CAUTION!

When using this device, be sure to observe the installation environment requirements regarding temperature, humidity, and power rating conditions, or restriction of use near a device generating strong magnetic or electromagnetic waves.

CAUTION!

The installation environment and location, device configuration, network, power supply, and other conditions are optimized for this device. If you want to change any condition, contact your nearest service representative. Otherwise, the functions and performance of this device may be impaired.

CAUTION!

No objects shall be positioned within the working area. If necessary, they must be removable.

CAUTION!

Do not put liquids, or foreign objects such as pins and clips into the equipment.

Otherwise, fires, electric shocks, or malfunctions may result.

Turn OFF the power source breaker immediately and unplug the equipment if any foreign objects have fallen into the equipment. Contact your nearest service representative.

Never disassemble the device.

CAUTION!

The display must not be used for diagnostic purposes.

CAUTION!

Federal law restricts this device to be sold by or on the order of a physician. (US market only.)

CAUTION!

If cracks appear on the display, immediately stop using it. Never use it when the display is damaged.

Note!

Radio interference standard Federal Communications Commission (FCC) Part 15 Class B applies to this equipment.

Note!

The equipment may only be used as intended.

2.3 Report of Incident

Note!

Any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the Member State in which the user and/or patient is established

2.4 Qualifications of Personnel

CAUTION!

This equipment is intended for use in radiographic examinations under the guidance of trained health care professionals.

2.4.1 Operating Personnel

WARNING!

Failure to follow the instructions given in this Manual could result in serious injury to the service person, patient and operator.

Before using the system it is required that the operating personnel is thoroughly familiar with the system and its operating instructions, in particular:

- Safety
- Function and Safety Checks

Note!

It is the responsibility of the owner to ensure that the system is operated only by trained radiologist, service technicians or product specialists.

2.4.2 Service Personnel

WARNING!

Before working with service and maintenance, always turn off the power and make sure to lock it, so it cannot be mistakenly turned on.

The equipment shall be serviced only by service technicians who:

- are completely familiar with the System
- have read and understood *Operator's Manual* and *Installation and Service Manual*.
- know how to remove power to the unit in case of an emergency
- are trained in the use of equipment and procedures of this type.

Note!

It is the responsibility of the owner to ensure that the technicians have the correct training and knowledge to perform service and maintenance.

2.5 Service and Maintenance

WARNING!

Risk of electrical shock.

If covers are removed, live parts are exposed.

WARNING!

When service or maintenance is to be performed, the service technician shall lock the equipment from all energy sources.

There are live parts for some time after having switched off the mains.

Always wait at least 15 seconds before working on the System.

WARNING!

The equipment must not be serviced or maintained while in use with the patient.

- ***Risk for personal injury.***

Service and maintenance shall only be performed when no patient is present.

The equipment must be checked according to the *Functions and Safety Checks* in the Operation manual to maintain reliability and serviceability, and to ensure the safety of the patients, the operator, and third parties.

If national rules or regulations specify more frequent checks and/or maintenance, such regulations must be observed.

2.6 Installation and Repair

WARNING!

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

CAUTION!

Only service technicians are allowed to open the covers.

CAUTION!

Do not remove, disassemble, change, modify, repair, or add any part.

CAUTION!

When installing this equipment in a different location, contact the manufacturer or the designated dealer.

Note!

For exchange of the collimator light field lamp, see the Collimator manual.

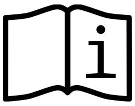
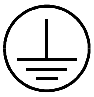
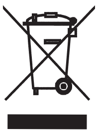
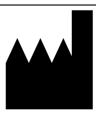
Modifications of, or additions to, the system must be made in accordance with the legal regulations and generally accepted engineering standards.

The manufacturer cannot assume responsibility for the safety features and for the reliability and performance of the equipment, if:

- installation of equipment expansions or modification are not approved by the manufacturer.
- installation of equipment expansions or modification are not carried out by persons authorized by the manufacturer.
- components are not replaced by original spare parts in case of a malfunction.
- the electrical installation of the room concerned does not meet the requirements or the corresponding national regulations.
- the system is not used in accordance with the operating instructions.

2.7 Safety and Warning Symbols

The following symbols are used for the system.

	Attention consult accompanying documents.
	To signify a general warning. This symbol is used in various places throughout the Manual where special precaution shall be observed.
	Type B applied part.
	Protective earth terminal.
	Earth terminal.
N	Connection point for the neutral conductor on permanently installed equipment.
	Squeezing hazard.
	This symbol indicates compliance of the equipment with MDR 2017/745 EU.
	Separate collection for electrical and electronic equipment.
	Manufacturer
	Date of manufacture
	To indicate the emission or the imminent emission of X-radiation.
	Marking on the emergency stop button. Activation of the actuator interrupts all mechanical movements and prohibits exposures.

2.8 Safety and Warning Labels on the Equipment

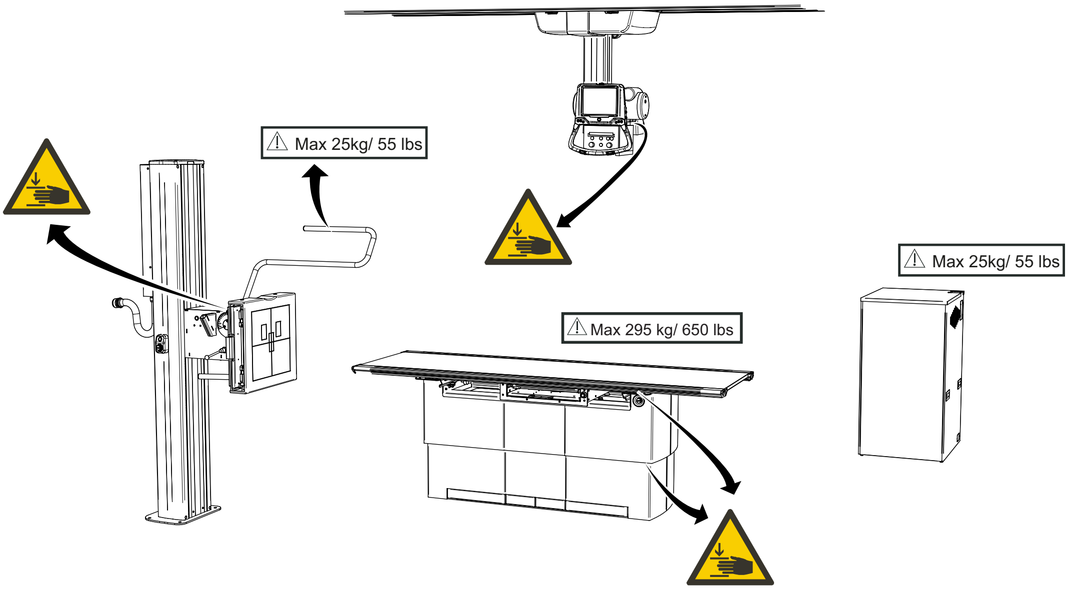


Fig. 2-1 Locations of safety and warning labels

2.9 Applied parts

Applied parts are intended contact surfaces for patients.

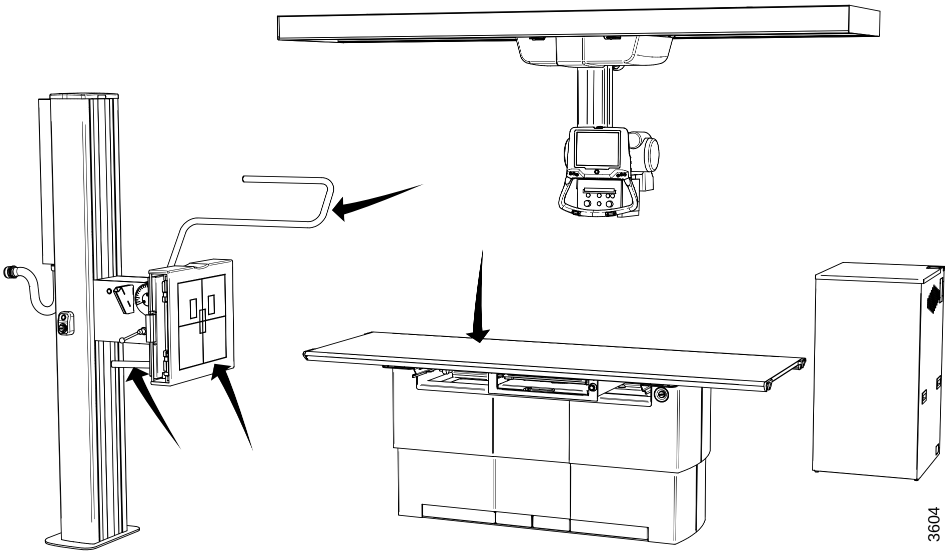


Fig. 2-2 Applied parts

2.10 Essential Performance and Basic Safety

The essential performance of the system is defined in the particular standard 60601-2-54, clause 201.4

- Accuracy of LOADING FACTORS
- Reproducibility of the RADIATION output
- AUTOMATIC CONTROL SYSTEM
- Imaging performance

These Essential Performances summarize together the functions necessary to obtain the Radiographic Image.

The equipment shall maintain basic safety while performing normal operations. The following degradations associated with basic safety shall not be allowed:

- Initiation of an unintended **non user initiated** motorized movement.
- Initiation and performing a **non user initiated** x-ray exposure.
- A **non user initiated** change of any loading parameter.

The equipment may exhibit temporally functional degradation of performance that does not affect essential performance or basic safety. Examples of such temporally functional degradation “degradation can be:

- Error or warning messages warning for a state that does not affect essential performance or basic safety.
- The system can prevent a **user initiated** xray exposure to start if an error is detected that can affect essential performance or basic safety.
- A termination of a **user generated** motorized movement.

2.11 Emergency Stop

Note!

It is recommended to train the operator regularly in the use of the emergency stop function so the operator feels confident in using it.

The system has five internal emergency stops; one on the OTC, one on each side of the table and two on the wallstand.

Pressing one of the emergency stop buttons, immediately cuts the power to all motorized movements. The emergency stop is also connected to the generator. The emergency stop will prevent a new exposure and terminate an ongoing exposure. A system message is displayed in OTC display when the button is activated.

To reset the emergency stop position, turn the emergency stop button clockwise. The button is released and the system is ready for use again.

There are additional external emergency stops as option.

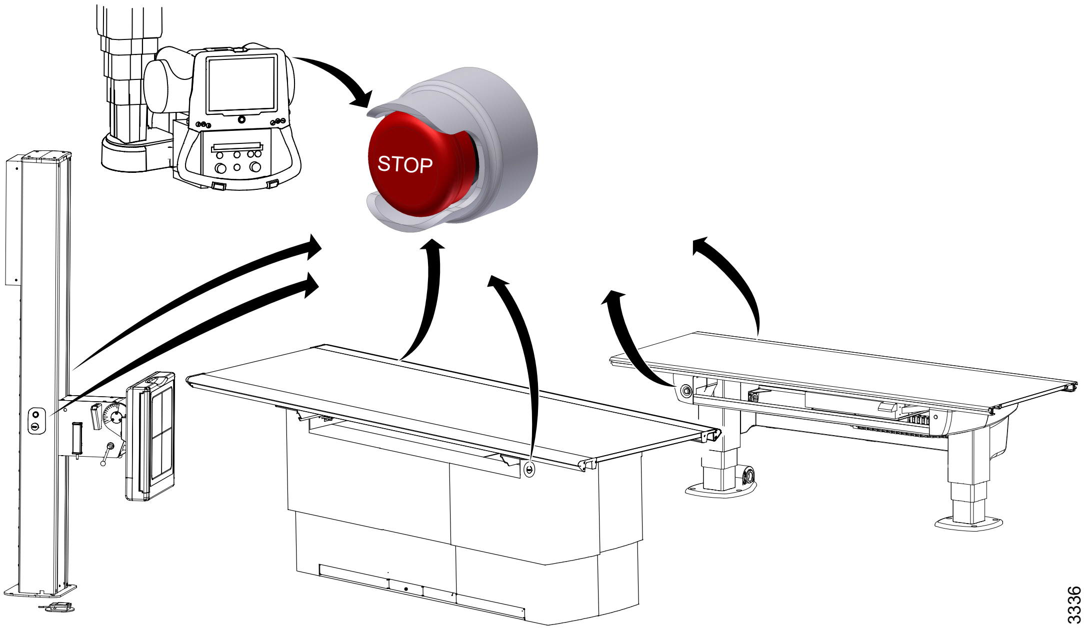


Fig. 2-3 Emergency stops

2.12 Radiation and X-ray tube

WARNING!

The patients, the operators and third parties must be protected against unnecessary X-ray radiation according to the local regulations.

WARNING!

The surfaces on the collimator and the X-ray tube can be warm.

The X-ray tube may be up to 85 °C, the collimator will not reach 60 °C.

WARNING!

Verify that correct collimator filter is used during exposure.

WARNING!

The SID shown in the display should correspond to SID shown on the collimator.

CAUTION!

To minimize the X-ray dose during the exposure, keep the distance between the tube focal spot and patient as large as possible allowed, considering the clinical application.

The beam size should be as small as possible.

Note!

Audio and visual communication must be possible between the operator and the patient when exposure is performed.

Note!

The X-ray beam should not be outside the boundaries of the detector holder.

2.12.1 Radiation Protection

Because of the ionizing nature of x-ray radiation, precautions have to be taken to minimize the harmful effects to patients and operators/staff during exposures. The aim is to achieve dose levels “as low as reasonable achievable”. National regulatory dose limitation requirements have to be followed.

Following four main factors control the amount (dose) of radiation received from a source:

Patient and operator dose:

Loading factors: Reducing the loading factors reduces the effective dose proportionally. Lower values will give more noise in the image.

Distance: Increasing the distance reduces dose levels according to the inverse square law.

Beam size: Keep the beam size as small as possible.

Shielding: Whenever possible/necessary protective shielding should be used to limit dose levels.

2.12.1.1 Protection Against Primary Radiation (Patient)

Following measures should to be taken to limit patient dose.

- Observe national dose limit regulations.
- Exposure parameters (time/mA) should be set as low as possible with an acceptable image noise level.
- Set focus to skin distance as large as possible.
- Always collimate the exposure field to the area of interest. This will both decrease the dose level and improve the image quality (less scattered radiation).
- If possible/necessary use protective shielding.

2.12.1.2 Protection Against Secondary Radiation

As the patient is the most significant source of scattered radiation during an x-ray exam, the staff and/or operator will unavoidable be exposed to ionizing radiation when inside the x-ray room during an exposure. Radiation doses from scattered radiation can be significantly high. The following safety measures should be taken to minimize scattered radiation to the staff.

- Increase the distance to the central beam to reduce dose levels according to the inverse square law.
- Use protective clothing, e.g. lead apron.
- Set the exposure parameters (time/mA) as low as possible.
- Use high kV and low mA to produce less scatter.
- Collimate the exposure field to the area of interest.
- Add collimator filter to reduce the scatter.
- Compression of patient.

Profile of Stray Radiation For Table

The diagram below, **Fig. 2-4**, shows the dependency of the scattered radiation on the distance from the central beam, height above the floor and kV potential. The decrease of the scattered radiation is expressed in percent of the central beam exposure rate (100%). The diagram also shows the decrease of scattered radiation when using protective clothing, also this expressed in percent of the central beam dose rate.

Fig. 2-4, shows that a higher kV increases the scattered radiation slightly. The diagram also shows that the best way to minimize the effect of the scattered radiation is an increased distance to the patient and by using a lead apron.

Central beam exposure parameters used:

KVP: 70, 100, 120 kV

Tube current: 100 mA

Exposure time: 100 ms

Field size: 43x43 cm

Film-Focus distance: 1 m

Patient simulation: 150 mm PMMA

Filter: 0 mm

Central beam dose rate measured on top of PMMA (750 mm from focus).

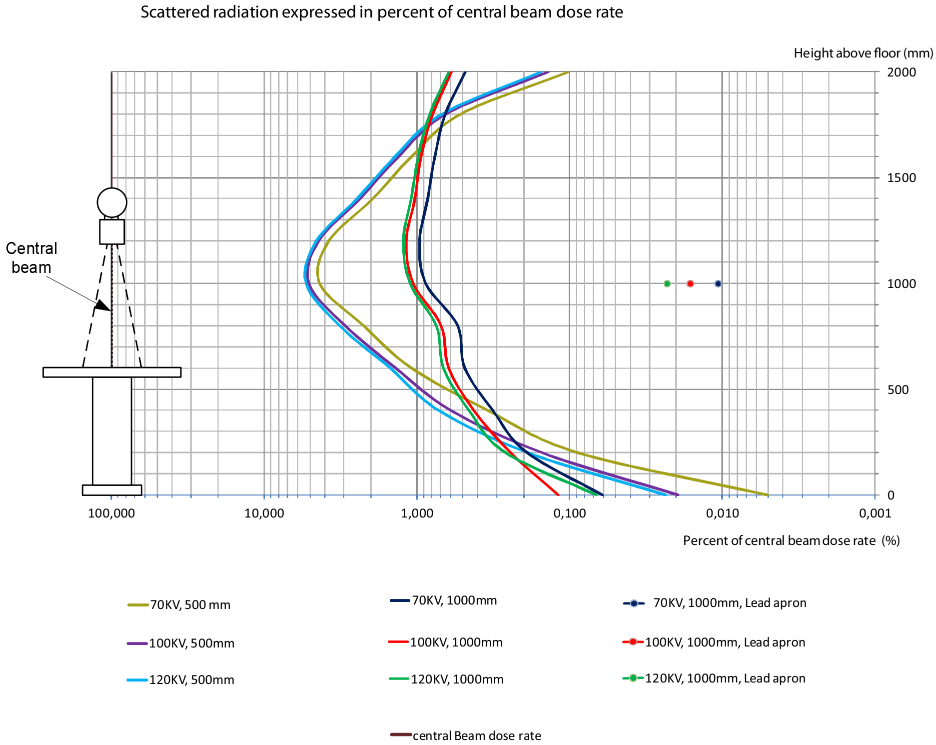


Fig. 2-4 Scattered radiation rate expressed in percent of central beam dose rate, with and without shielding

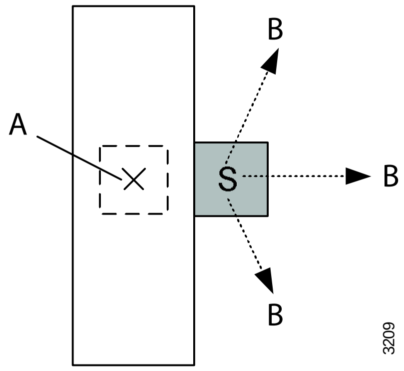


Fig. 2-5 S = Significant zone of occupancy

A Central beam
B Decreasing

Fig. 2-5 shows a top view of the table and the zone of occupancy, where the arrows B show the direction of decreasing scatter radiation levels.

Profile of Stray Radiation For Wallstand

The diagram below, **Fig. 2-6**, shows the dependency of the scattered radiation on the distance from the central beam, height above the floor and kV potential. The decrease of the scattered radiation is expressed in percent of the central beam exposure rate (100%). The diagram also shows the decrease of scattered radiation when using protective clothing, also this expressed in percent of the central beam dose rate.

Fig. 2-6 shows that a higher kV increases the scattered radiation slightly. The diagram also shows that the best way to minimize the effect of the scattered radiation is with an increased distance to the patient and by using a lead apron.

Central beam exposure parameters:

KVP: 70, 100, 120 kV

Tube current: 100 mA

Exposure time: 100 ms

Field size: 40x40 cm

Film-Focus distance: 1,5 m

Patient simulation: 150 mm PMMA

Filter: 0 mm

Central beam dose rate measured on top of PMMA (1250 mm from focus)

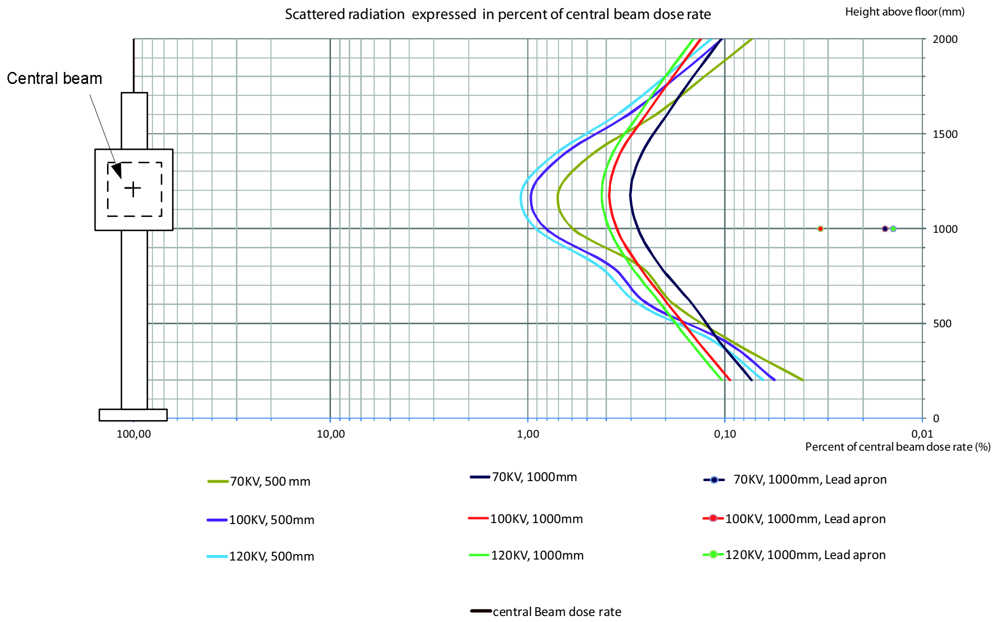


Fig. 2-6 Scattered radiation rate expressed in percent of central beam dose rate, with and without shielding

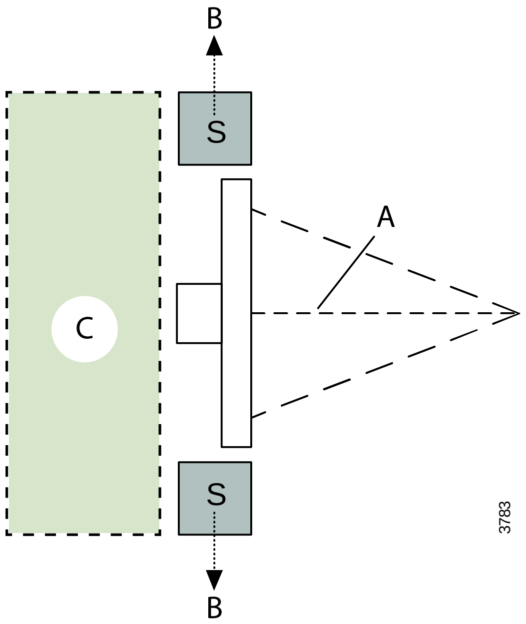


Fig. 2-7 shows a top view of the wallstand and the zone of occupancy, where the arrows B show the direction of decreasing scatter radiation levels.

Fig. 2-7 S = Significant zone of occupancy

A Central beam
B Decreasing
C Residual radiation area

2.12.1.3 Protection Against Residual Radiation

The remaining part of the X-ray beam after having passed the plane of the image reception area (detector and detector holder) can be significantly high. Never stand behind the wallstand during an exposure, see **Fig. 2-7**.

2.13 Mechanical Safety

2.13.1 General

WARNING!

All motorized movements shall be supervised by trained personnel.

WARNING!

Tracking shall be supervised by trained personnel.

WARNING!

Wheelchair patients shall always be placed outside the working area, when operating any motorized movement.

Note!

Surrounding equipment is not subject of the collision warning.

It is the operator's duty to ensure that any danger to the patient or third parties is prevented before the system is operated.

2.13.2 Overhead Tube Crane

WARNING!

Squeezing hazard between the overhead crane and wallstand respective between the overhead tube crane and table.

The operator should be beside the patient for support to avoid any risk of injury when handling the overhead tube crane.

WARNING!

Squeezing hazard can occur between column segments and beta rotational assembly interface.

WARNING!

Squeezing hazard can occur between the column and the plastic corner around the alpha movement.

WARNING!

Squeezing hazard can occur between support arm and high tension cable inlet to the tube.

CAUTION!

The IR sensor (option) underneath the OTC is exclusively intended for table protection.

It is not intended for patient protection.

Possible squeezing hazard areas and placement of warning label:

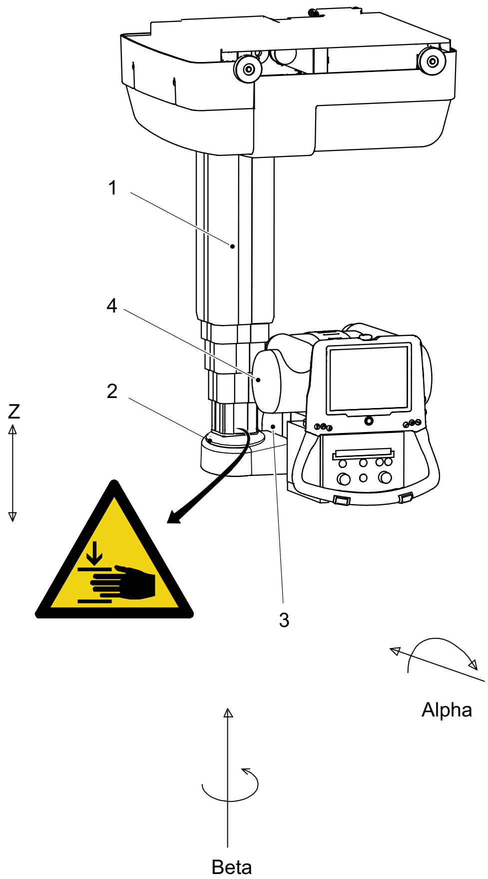


Fig. 2-8 OTC, mechanical safety

1. *Column (Z)*
2. *Column bottom plate*
3. *Cover*
4. *X-ray tube*

Squeezing hazard can occur between the:

- column (Z) and the column bottom plate when the column is moving upward (Z-direction).
- cover and the column (Z) when the X-ray tube is moving in beta direction.

2.13.3 Cabinet

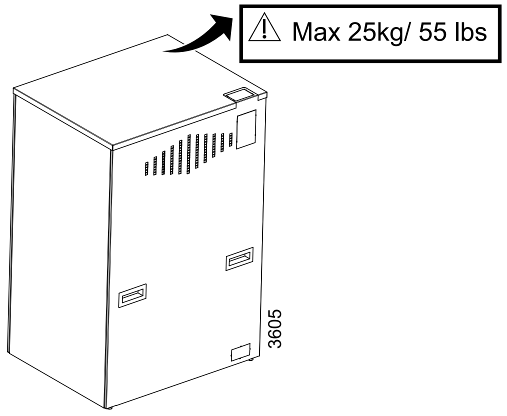


Fig. 2-9 Placement of warning and safety label.

Cabinet, mechanical safety

Max 25 kg/ 55 lbs

2.13.4 Table

WARNING!

Squeezing hazard can occur between the:
- ***table top and the top of the detector holder***
- ***table top and the detector holder rail***
- ***detector holder rail and the detector holder***
- ***detector holder and the cover***
- ***vertical lift segments when moving down in Z-direction (closed table)***
- ***columns and the footplate (two column table)***
- ***cover and the column foot cover***
- ***detector holder and vertical lift segment***

Possible squeezing hazard areas and placement of warning labels:

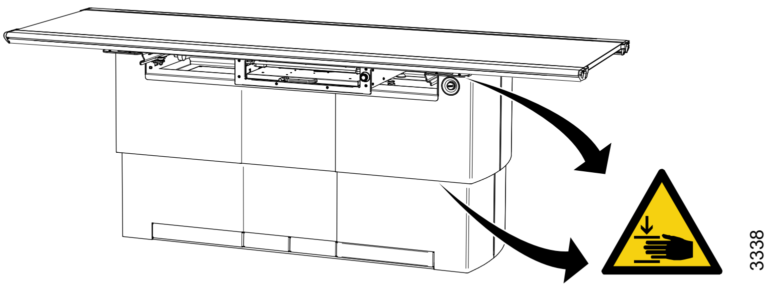


Fig. 2-10 Closed table

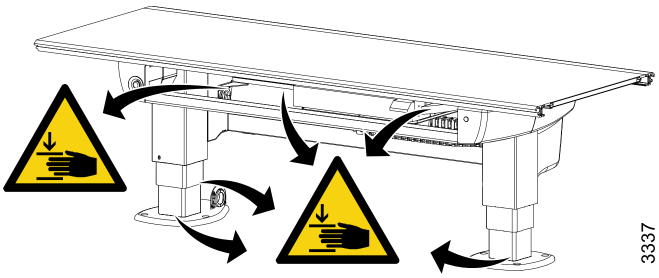


Fig. 2-11 Two column table (option)

2.13.4.1 Safety Issues when Positioning a Patient

WARNING!

Be aware of unwanted motion when releasing the brakes.

WARNING!

Risk of injury during transfer of the patient between the hospital bed and the table.

The hospital bed shall be placed in direct contact with and at the same height as the table.

The table top shall be locked.

WARNING!

Risk of squeezing hazards.

The patients shall always have their extremities placed over the table top.

WARNING!

Wheelchair patients shall always be placed outside the working area, when operating any motorized movement.

Note!

Do not lean against the floating table top.

Lock and center the table top when transferring the patient to the table.

The hospital bed shall always be placed in direct contact and in the same height as the table.

To reduce the lateral forces on the table the operator should be placed on the opposite longitudinal side of the patient and the hospital bed. The operator (**A**) should drag the mattress with the patient from the hospital bed to the table.

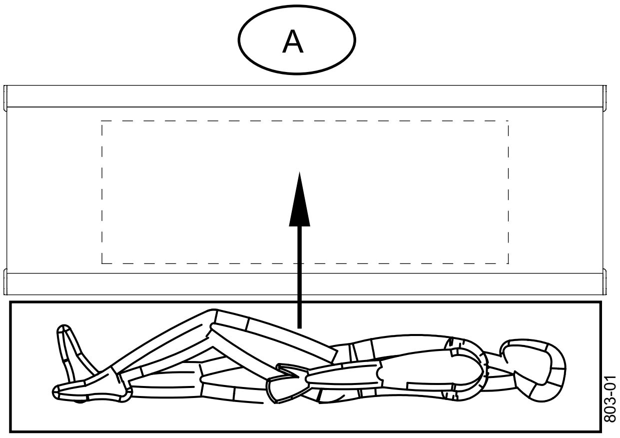


Fig. 2-12 Transfer patient to table by operator A

Patient Weight Restrictions

Table Top Centered

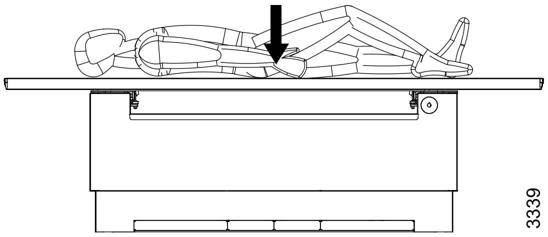


Fig. 2-13 Table top centered

Type	***Maximum patient weight***
Closed table	*295 kg/ 650 lb*
Two column table	*300 kg/ 661 lb*

Table Top Outside Table Frame

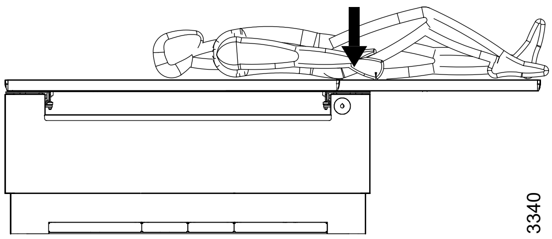


Fig. 2-14 Table top outside table frame

Type	***Maximum patient weight***
Closed table	*200 kg/ 440 lb*
Two column table	*200 kg/ 440 lb*

The table frame is marked with the maximum weight when positioning in outer positions.

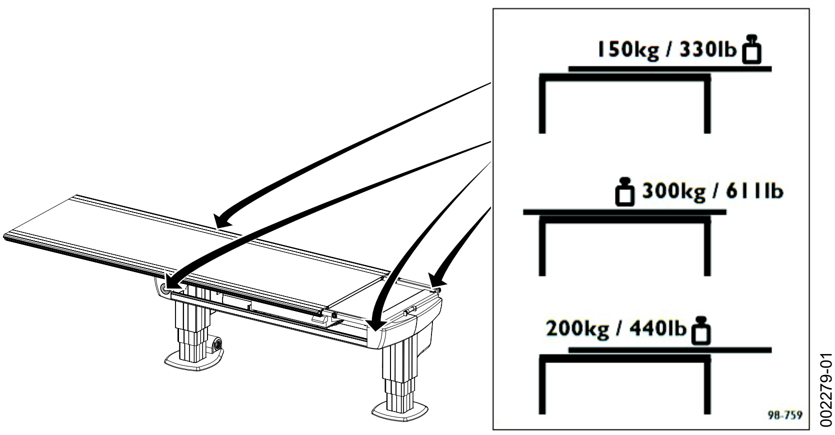


Fig. 2-15 Maximum patient weight label

2.13.4.2 Working Area, Table

WARNING!

Risk of squeezing hazard.

Patients shall be outside the working area or placed on the table, when operating any motorized movement.

WARNING!

Risk of squeezing hazard.

All obstacles placed within the working area, must be moveable for easy patient release.

CAUTION!

To avoid any injuries to patient, user or damage to system, peripherals should always be placed outside the working area.

The working area comprises the table top including the stroke length of the table top in the X- and Y-direction. The measurements in the figure show the length of stroke in the X- and Y-direction. The dimensions have some tolerances and can differ from the manufacturer's.

Closed Table

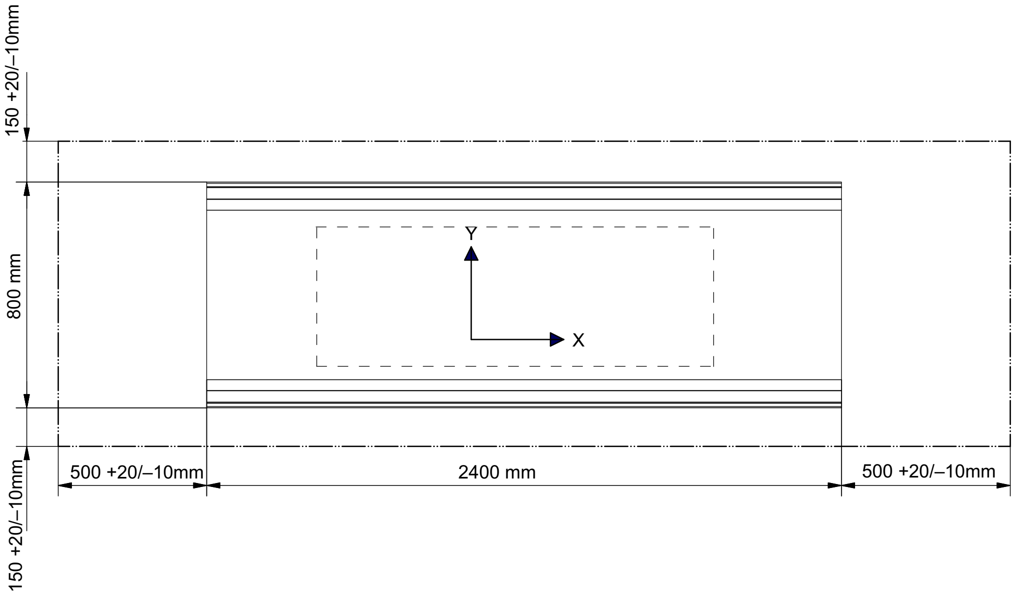


Fig. 2-16 Table top stroke length

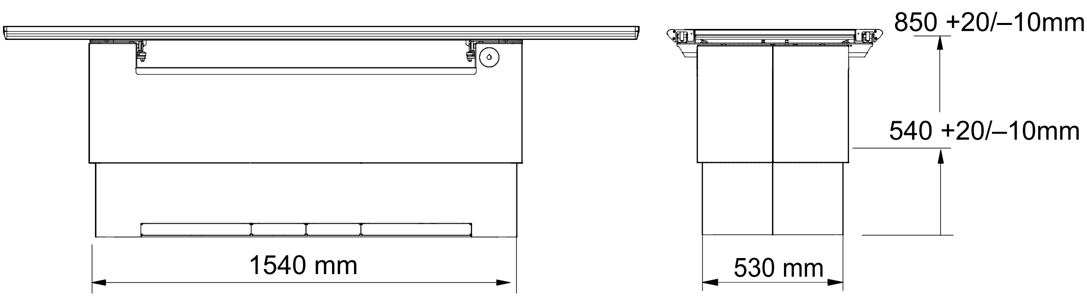


Fig. 2-17 Working area underneath table

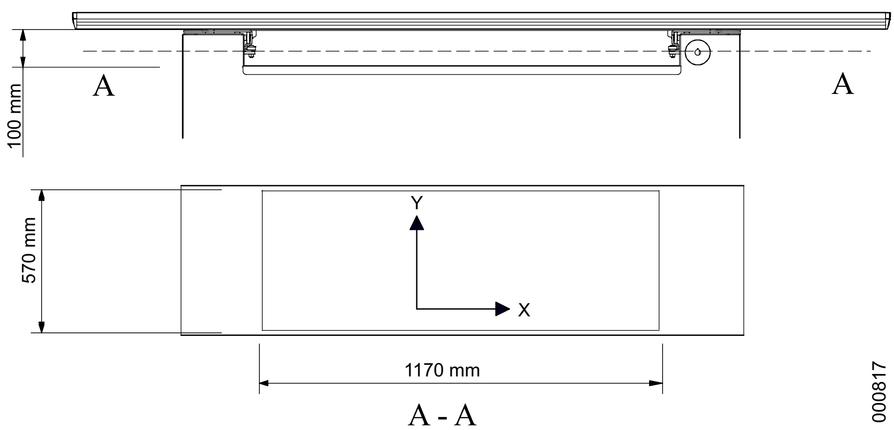


Fig. 2-18 Detector movement

Two Column Table (option)

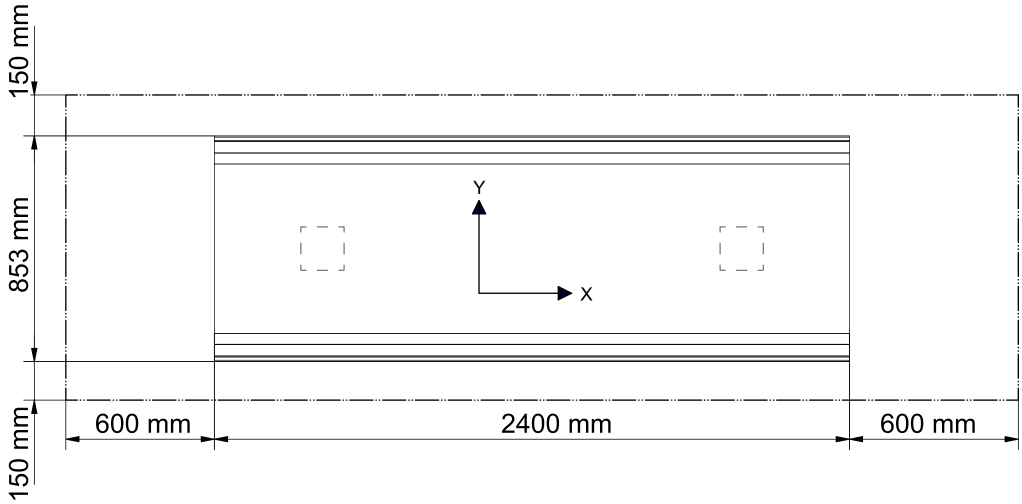


Fig. 2-19 Table top stroke length

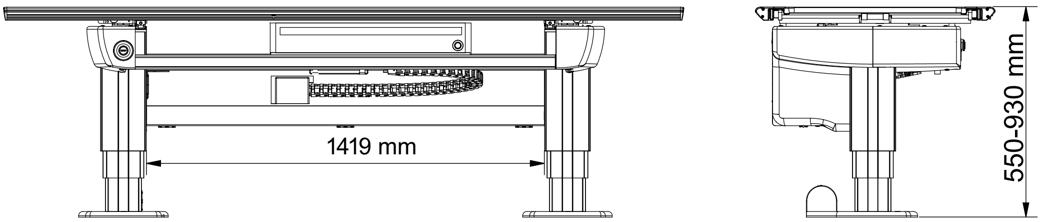


Fig. 2-20 Working area underneath table

The detector movement is up to 850 mm, depending on detector type.

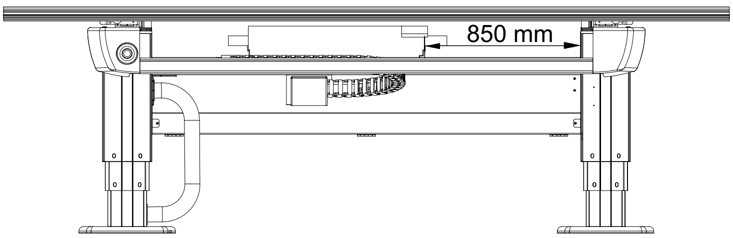


Fig. 2-21 Detector movement

2.13.5 Wallstand

2.13.5.1 Safety Issues When Positioning Patient

WARNING!

Be aware of unwanted motion when releasing the brakes.

Note!

Maximum weight on the wallstand lateral armrest is 25 kg/ 55 lbs.

2.13.5.2 Working Area, Wallstand

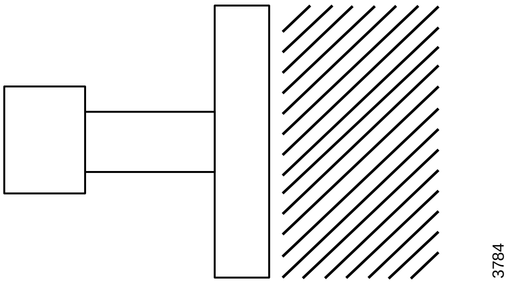


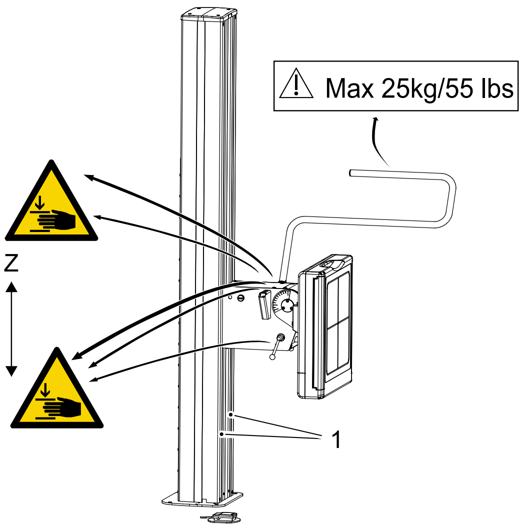
Fig. 2-22 Working area, wallstand

The working area of the wallstand is the area in front of the detector holder

2.13.5.3 Standard Version Wallstand

WARNING!

Risk of squeezing between the tilted image receptor holder and the floor.



Getting stuck in the slide opening (**1**) is a squeezing hazard when the detector holder is moving downward (Z-direction)

Possible squeeze hazard areas and placement of warnings and safety labels, see **Fig. 2-23**

The system is balanced with counterweights and whenever any item is removed from the wallstand it becomes unbalanced. If the brake is released when the wallstand is unbalanced, the detector holder moves and can cause injury.

Fig. 2-23 Possible squeeze hazards

1. *Slide opening of detector wagon*

2.13.5.4 Motorized Wallstand

CAUTION!

Patients shall be outside the working area when operating any motorized movement.

2.14 Safety Functions

2.14.1 Opposite Buttons Pressed

If, at any time, two from each other opposite buttons are pressed, for example movements up and down, the movement is stopped. Both buttons must be released before any movement is allowed.

2.14.2 Dead Man’s Grip

All movements require constant activation of the chosen button.

If the operator releases one of the buttons/controls, the system will immediately stop or engage the brakes (manual movements). The exposure operator console has the same functionality.

2.14.3 Watchdog

One important issue for the safety in the system is the node error handling e.g. transmission error, software error or irregular behaviour of a node. The system is built to prevent an uncontrolled movement.

2.14.4 Two Column Table (option)

2.14.4.1 Table Top Guard (option)

The table has a collision detection system that protects the table. It activates if a collision is detected and all movement is stopped.

2.14.5 Closed Table

2.14.5.1 Vertical Travel (Z-Movement) Safety

The table has a vertical travel safety system to protect the table top. When the table top collide with something, the Z-movement will stop. You will have to push a button (kick box control/manoeuvre hand control/foot control) in either direction to be able to move the table again.

When a collision in Z-direction is detected, the stand has to be moved in the opposite direction before it can be moved in the original direction again.

2.14.5.2 Indication of Power to the Table

The device is powered when the green indicator light (A) on the table frame is lit.

Note!

When no power, the usability of the table is highly limited.

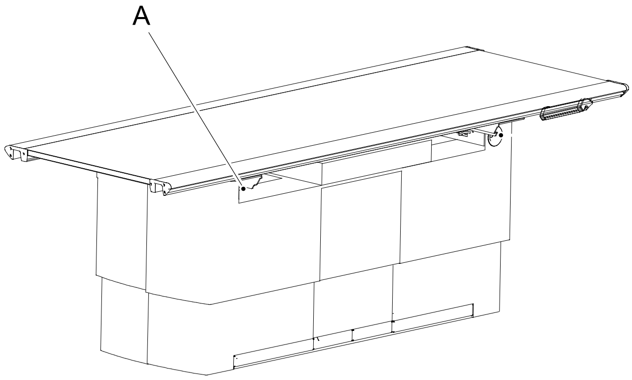


Fig. 2-24

2.14.6 Wallstand

The product is balanced with counterweights and whenever any item is removed from the wallstand it becomes unbalanced. If the brake is released when the wallstand is unbalanced, the detector holder moves and can cause injury.

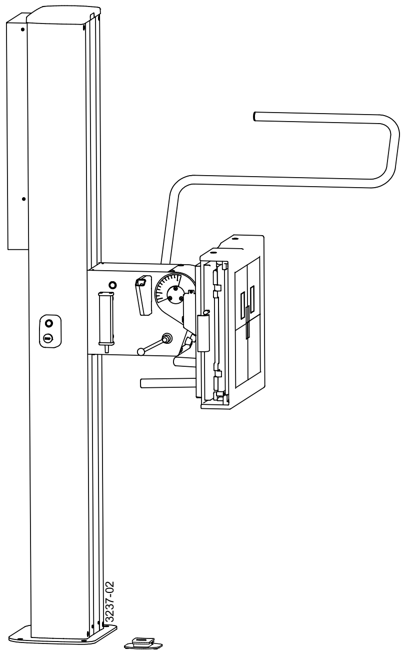


Fig. 2-25 Wallstand

WARNING!

Be aware of unwanted motion when releasing the brakes.

2.14.6.1 Manual Wallstand

The wallstand is strictly manually controlled. All movements are balanced which means that very little force needs to be applied. To move the system up or down, the brake has to be released, by pressing constantly and pushing the detector holder manually up or down.

2.14.6.2 Motorised Wallstand

Collision Detection

Every motorized movement has a collision detection. All movements are stopped when the collision detection is activated and the display shows an error message.

2.15 IT- and Cyber Security

CXDI NE does not support any specific security measures. It is assumed that CXDI NE is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access.
- Firewall or router protections to ensure that CXDI NE only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g., VPN).

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy. No equipment other than what is delivered with the product should be connected to the computer.

2.16 Safety Zone, Definition

At installation, a safety zone is defined.

The intention of the safety zone is to prevent collision with the patient during tracking downwards. When the lowest part of the overhead tube crane (OTC) is above the safety zone, tracking is possible. When it is inside the safety zone, tracking is not possible.

The safety zone does not affect the function of the manual movement (no tracking) or tracking upwards.

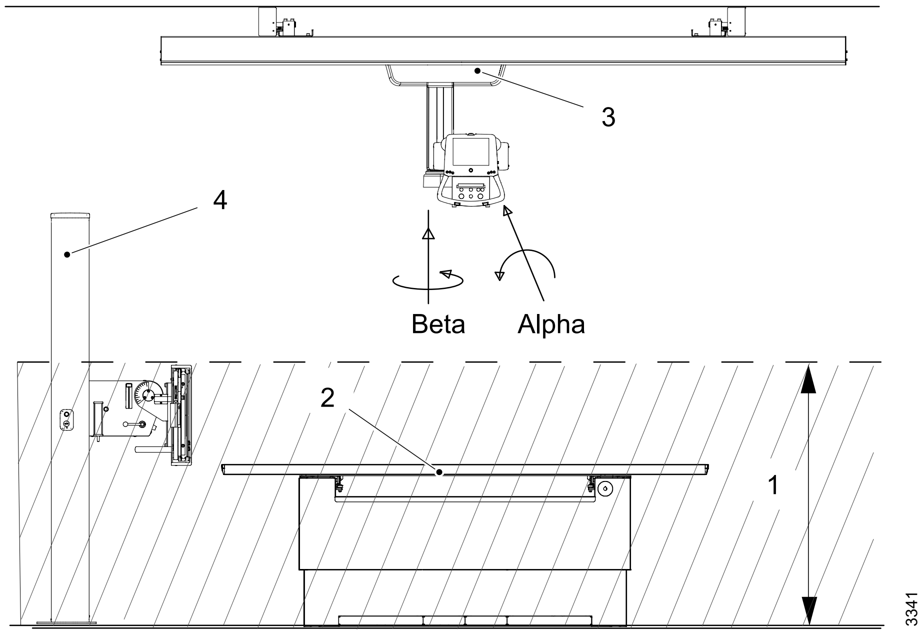


Fig. 2-26

1. *Safety zone*
2. *Table*
3. *OTC*
4. *Wallstand*

2.16.1 Table

The tracking downwards is not possible in the safety zone.

The safety zone does not affect the function of tracking upwards.

2.16.2 Wallstand

When the alpha angle is outside the range of +45° to -45°, tracking is possible in safety zone.

2.17 Electromagnetic Compatibility (EMC)

The system complies with the requirements of IEC 60601-1-2:2014 regarding electromagnetic compatibility. Surrounding equipment shall follow the standard IEC 60601-1-2:2014.

WARNING!

Do not use this equipment adjacent to or stacked with other equipment.

Such use could lead to improper operation.

Verify that the equipment is operating normally, if such use is necessary.

WARNING!

Do not use other accessories, transducers and cables than those specified or provided by the manufacturer.

Such use could lead to increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

WARNING!

Do not use portable RF communications equipment (including peripherals such as antenna cables and external antennas) closer than 30 cm (12 inches) to any part of the system, including cables specified by the manufacturer.

Such use could lead to degradation of the performance of this equipment.

CAUTION!

Do not place the system near MRI equipment or other equipment that generates a strong magnetic field.

CAUTION!

Mobile telephones and other radiating equipment can interfere with the function of the system and can therefore cause safety hazards.

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

<table>
<tr><th colspan="3">Guidance and manufacturer's declaration - electromagnetic emissions</th></tr>
<tr><th>Emissions test</th><th>Compliance</th><th>Electromagnetic environment - guidance</th></tr>
<tr><td>RF emissions CISPR 11</td><td>Group 1</td><td>The system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td></tr>
<tr><td>RF emissions CISPR 11</td><td>Class B</td><td rowspan="3">The system is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purpose. For information purpose the system complies with IEC61000-3-11 and is suitable for connection to public mains network if the impedance is 0.32 Ohm or lower</td></tr>
<tr><td>Harmonic emissions IEC 61000-3-2</td><td>Not applicable</td></tr>
<tr><td>Voltage fluctuations/ Flicker emissions IEC 61000-3-3</td><td>Not applicable</td></tr>
</table>

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

Guidance and manufacturer's declaration - electromagnetic emissions			
Emissions test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Radiated emissions CISPR 16-2-3	30 MHz to 230 MHz: QP 40 230 MHz to 1 GHz: QP 47	30 MHz to 230 MHz: QP 40 230 MHz to 1 GHz: QP 47	
Conducted emissions CISPR 16-2-1	150 kHz to 500 kHz: QP 100+20, average 90 500 kHz to 5 MHz: QP 86+20, average 76 5 MHz to 30 MHz: QP 90+20 (at 5 MHz) decreasing linearly to 73+20 (at 30 MHz) average 80 (at 5 MHz) decreasing linearly to 60 (at 30 MHz)	150 kHz to 500 kHz: QP 100+20, average 90 500 kHz to 5 MHz: QP 86+20, average 76 5 MHz to 30 MHz: QP 90+20 (at 5 MHz) decreasing linearly to 73+20 (at 30 MHz) average 80 (at 5 MHz) decreasing linearly to 60 (at 30 MHz)	
	Note: These limits apply to equipment with a rated power > 20 kVA and intended to be connected to a dedicated power transformer or generator, and which is not connected to low voltage (LV) overhead power lines. 20 dB relaxation for Quasi-Peak (QP) is allowed for Radiography and pulsed Radiography (Intermittent Mode).		

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

Guidance and manufacturer's declaration - electromagnetic immunity			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharger (ESD) IEC 61000-4-2	± 8 kV contact ±15 kV air	± 8 kV contact ± 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines + 1 kV for input/ output lines 100 kHz repetitive frequency	± 2 kV for power supply lines + 1 kV for input/ output lines 100 kHz repetitive frequency	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	1.0 kV 1.2 kV 2.0 kV 0,90, 180, 270 degree phase angle	1.0 kV 1.2 kV 2.0 kV 0,90, 180, 270 degree phase angle	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0.5 cycle (0, 45, 90, 135, 180, 255, 270, and 315 degrees phase angle) <5% U_T (>95% dip in U_T for 1 cycle) 70% (30 % dip in U_T for 25/30 cycles) <5 % U_T (>95 % voltage dip in U_T for 250/300 cycles)	<5 % U_T (>95 % dip in U_T) for 0.5 cycle (0, 45, 90, 135, 180, 255, 270, and 315 degrees phase angle) <5% U_T (>95% dip in U_T for 1 cycle) 70% (30 % dip in U_T for 25/30 cycles) <5 % U_T (>95 % voltage dip in U_T for 250/300 cycles)	Mains power quality should be that of a typical commercial or hospital environment. If the user of the system requires continued operation during power mains interruptions, it is recommended that the system should be powered from an uninterrupted power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Guidance and manufacturer's declaration - electromagnetic immunity			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Note! *U_T is the AC mains voltage prior to application of the test level.*			
			Portable and mobile RF communications equipment should be used no closer to any part of the system, including cables, than the recommended separation distance, calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance:
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms (ISM and amateur radio bands)	3 Vrms 150 kHz to 80 MHz 6 Vrms (ISM and amateur radio bands)	$d = 1.2 \sqrt{p}$
Radiated RF IEC 61000-4-3	3 V/m 10 V/m 80 MHz to 2.7 GHz	3 V/m 10 V/m 80 MHz to 2.7 GHz	$d = 1.2 \sqrt{p}$ 80 MHz to 800 MHz $d = 2.3 \sqrt{p}$ 800 MHz to 2.7 GHz where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m).
Proximity field from wireless transmitters 61000-4-3	9 V/m to 28 V/m 15 specific frequencies	9 V/m to 28 V/m 15 specific frequencies	
			Interference may occur in the vicinity of equipment marked with the following symbol: 
Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

Recommended separation distances between portable and mobile RF communications equipment and system

The system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the system as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter**		
	150 kHz to 80 MHz $d = 1.17 \sqrt{p}$	80 MHz to 800 MHz $d = 0.35 \sqrt{p}$	800 MHz to 2.7 GHz $d = 0.7 \sqrt{p}$
0.01	0.12	0.04	0.07
0.1	0.37	0.11	0.22
1	1.17	0.35	0.7
10	3.69	1.11	2.21
100	11.67	3.5	7

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption as reflection from structures, objects and people.

3 Theory of Operation

3.1 System Description

3.1.1 General

The system consists of a system cabinet, an image system and an overhead tube crane (with an X-ray tube and a collimator).

The system can be integrated with the following components:

- a wallstand with a detector
- a table with a detector
- a wallstand and a table with a detector.

3.2 Electrical Design

3.2.1 General

3.2.1.1 System Power Supply

The entire system, except for the image system PC, is powered on from the mini console. The system is designed for the following power inputs:

- 480V 3 ~
- 400V 3 ~
- 400V 3N ~

The system power supply design allows the main part of the system to be powered when the generator ON button is pressed. Consequently it is also switched off when the generator OFF button is pressed. The power to the image system, i.e. the DR sensors, is always powered.

3.2.1.2 Interface and System Logic

The internal system interface has a gathered connection point in the system cabinet. Most of the internal interfaces are collected into one interface board.

The interface toward the image system is handled through a separate board. This board acts as a master in the system and communicates with the image system via Ethernet bus, and with the X-ray system via CAN bus.

3.2.1.3 Exposure Control

The generator has a set of input and outputs, used to validate the conditions for exposure.

These I/Os are validated in different states of the exposure sequence. The behaviour of the system, i.e. the exposure control sequence, is set during installation/production. The system supports the following control signals:

- *Door interlock (input)*

  The *Door interlock* input is designed to inhibit exposure and terminate an on-going exposure. This signal is normally used as signal to determine if the door to the examination room is closed. The exposure is inhibited if the circuit is open.
- *EM-interlock (input)*

  The *EM-interlock* input is designed to inhibit a new exposure if the emergency stop circuit is open, i.e. an emergency stop has been activated. An activation of the emergency stop during exposure, does not terminate the exposure but requires that the emergency stop circuit is closed before enabling a new exposure.
- *System interlock*

  The system interlock signals (table, wallstand) are used to inhibit exposure if the overhead tube crane is not in position.
- *X-ray light (output)*

  The *X-ray light* output is designed to be used for exposure indication. The output is activated during exposure.

3.2.1.4 Emergency Stop Circuit

The emergency stop circuit is an independent circuit which means that by activating an emergency stop, the power to the motors cuts unconditionally and inhibits exposure.

By opening the emergency stop circuit, the power to the motor is switched off and the exposure control circuit is opened, which will inhibit exposure. The logic power to the system control boards is independent of the emergency stop circuit and is therefore always live. Note that activation of the emergency stop does not stop an on going exposure, just inhibits a new exposure.

3.2.2 Overhead Tube Crane

The electronics of the column, consist of a motor (AC) with a frequency converter, motor brake, electrical end stops, safety switches for detection of chain failure and position sensor (absolute encoder).

The motor is powered by the frequency converter which is controlled from the Z/Master control board. The control board controls the motor brake (electric). The brake is released during movement and engaged at stand still. The brake is activated by the emergency stop, securing that the column is brought to a complete stop.

The positioning of the column is supervised using an absolute encoder and electrical end stop switches. The encoder is connected to the Z/Master board which is controlling the motor and the motor brake. The end stop switches are wired directly to the control signals of the frequency converter and when activated they are inhibiting a movement to be initiated. The design of this circuit allows movement in the opposite direction, e.g. if the high end stop is activated, only a downward movement is possible. The motor drives the column with the use of two parallel chains to secure the suspension from a single fault (one broken chain). A broken chain is detected via electrical switches that are connected to the emergency stop circuit. On detection, the emergency stop circuit is opened, inhibiting movement until the chain is replaced.

3.2.2.1 Electrical Brakes for The X- and Y Movements

The electrical brakes for the X- and Y movements are controlled via relays on the CIB-board (placed in the ceiling wagon). The relays are controlled by the Z/Master board.

The Z/Master board communicates with the display board that supervises the handle bar control buttons (release X, release X/Y, release Y). The brakes are powered with 24V, the brakes can always be released as long as the system has logic power. Emergency stop circuit does not inhibit the brake release function.

The X- and Y movement can also be supplied with electrical index switches (option). The function of the index switches is to inhibit exposure if the OTC is not placed at the specified position.

3.2.2.2 Alpha, Beta

The electrical brakes for the Alpha- and Beta movement are controlled via relays on the SBB-board (placed behind the X-ray tube). The relays are in turn controlled by the display board that supervises the handle bar control buttons. The brakes are powered with 24V which means that the brakes can always be released as long as the system has logic power (emergency stop circuit does not inhibit the brake release function).

The alpha rotation includes a switch that is used for enabling and disabling tracking below the system safety height limit. The switch needs to be activated in order to enable tracking against a wallstand (alpha angle >45°).

3.2.3 Closed Table

The table is powered from the system cabinet. The table has its own power supply, generating the internal 24 V power.

The table control board (TCB) is the main hub in the system, all internal electrical components connects to the board.

The only motorized movement is the vertical movement (Z). The vertical movement is controlled via a kick list (foot pedal) or a hand control. The controls have separate controls for each direction (up/down).

3.2.3.1 Vertical Lift

The electronic parts of the lift consists of a frequency inverter, motor (AC), electrical end stops, low speed switches and a safety switch.

The movement starts when the frequency inverter receives a signal from the foot switch/ handlebar which starts the motor. In case of hardware failure the safety switch will stop the movement downward and the movement upward will be stopped by a mechanical end stop.

3.2.3.2 Table Top Brakes

When activating the brake release control, a relay on the TCB board activates the brake magnets. The magnets affect the friction coated metal plates and the unit is released.

Table top crash guard

The table top crash guard shall only primarily be used as a safety precaution for the system, but will as well limit the risk of personal injury, although the crash guard does not guarantee patient protection.

To be able to detect a collision four micro-switches are placed between the table and the table top. When the table crashes into an object, the micro-switches will stop the moment in the on going direction, but it will allow the movement in the opposite direction. When the object is removed the table can move in both directions again.

3.2.4 Electrical Design Two Column Table (option)

The table has its own power supply, generating the internal 36 V power and the 24 V logic power.

The main power (230 V) to the table as well as the detector holder control signals are routed via the system cabinet. The table mains is controlled in the same manor as the OTC, e.g. the On/Off- function is controlled via the generator On/Off- function.

The table control board controls all functions of the table besides the detector release function and the emergency stops which are controlled by the user directly. All signals, except the emergency stop circuit, pass through the control board where they are validated. If the requested operation is cleared by the control board, the operation is carried out.

The control board controls a trig relay which is connected to a relay that is used for switching on and off the power to the drivers (36 V). The trig relay will react in case of signal loss from the control board, i.e. if the control board is malfunctioning.

Note!

The emergency stop does not affect the logic power (24 V), hence the control board will be powered at all times.

The only motorized movement is the vertical movement (Z).

The vertical movement is controlled via a hand control (standard control unit) and/or a foot control unit. The controls has separate controls for each direction (up/down). Each control has two switches that are supervised by the table control board. The control board controls to the two drive units (that in turn controls the power to the motors. The movement is continuously controlled by the master node via the position sensors that are placed within each column.

3.2.4.1 Electronic Parts

The components included in the table are mainly dependent on the configuration of the columns (motorized vertical movement, motorized detector movement or fixed table height).

The main components (including motorized vertical movement) are:

- A power supply
- A control board (CB)
- Two drivers
- Controls (foot control for the vertical movement and the table top brakes and a switch for controlling the brake for the detector holder).
- A tilt sensor
- A power relay (36 V)
- A trig relay (time relay), used as watchdog, timer triggered.
- Emergency stops (2 pcs.)
- Electrically controlled brakes for the table top and the detector holder.
- Sensor for the table height (potentiometer).
- Electrical options available for two column table (including motorized vertical movement) are:
- An output (relay) that will be activated when the table top brakes are released.
- Table top crash guard (stops the vertical movement if a collision is detected).
- External emergency stop input
- Controls (table top brakes only)

3.2.4.2 Columns

The electronics of the columns consists of a motor (DC), motor brake, electrical end stops and position sensor (potentiometer).

The movement is started when the motor receives power from the driver and the control board releases the motor brake. The sensor feeds the position back to the control board. In one of the two columns an additional sensor is added. The extra sensor is used as a position input to the system and is isolated from table internal electronics. In case of hardware failure or an incorrect calibration the movement is stopped when one of the electrical end stops is activated. The end stops activates a hardware input on the driver which automatically inhibits the movement in the current direction (movement stopped).

3.2.4.3 Brakes

The table top brakes are controlled via an output of the control board. The detector brake is connected via a relay on the 24 V logic power. This means that the brakes can always be released as long as the table is powered (24 V logic power). On activation of a brake release control, the control board activates a relay that in its turn activates (power is activated) the brake magnets. The magnets affect the friction-coated metal plates and the unit is released.

The brakes include a solenoid and two friction-coated metal plates. The solenoid releases the brake, two metal plates away from the table top U-bar. When the solenoid has pulled the two metal plates, a micro-switch deactivates the larger coil of the solenoid which reduces the current used. When the brake is deactivated (engaged), the power to the smaller coil is cut and a spring pulls a gear mechanism, which pushes the metal plates toward the U-bar. This means that the brake is normally engaged and is not dependent on power to stay engaged.

The detector brake consists of a simple magnet that is activated when the powered (24 V). When powered the magnet becomes magnetized and reacts against a metal plate inserted in the table frame.

3.2.4.4 Table Top Output (option)

The system is able to deliver an output that is activated when the table top brakes are released. The CB activates a relay when the brake output is activated. The output is intended to be used for activating a collimator lamp but may be used for other purposes defined by the user.

3.2.4.5 Tilt Sensor

A sensor that detects the angle (tilt angle) of the table is used for protecting the system.

The tilt sensor delivers an analogue signal to the control board. The control board deciphers the signal and if the tilt angle is outside the specified range the control board activates an output that in turn activates a relay. The activation of the relay affects the hardware inputs on the drivers and the movement in the current direction is inhibited (movement stopped). To secure a quick and effective stop the motors for the vertical movement is short circuit.

3.2.4.6 Table Top Crash Guard (option)

The table top crash guard shall only be primarily used as a safety precaution for the system but will of course limit the risk of personal injury as well, although the function does not guarantee the accuracy needed for usage as a patient protection.

To be able to detect a collision, four sensors are placed between the table frame and the columns. The sensor produces an analogue signal that goes to an input on the guard board. The guard board amplifies the signal and check if the value is within the specified range. If the signal is not within range the guard board activates an output which in turn activates a relay. The activation of the relay affects the hardware inputs on the drivers and the movement in the current direction is inhibited (movement stopped).

The guard function is only activated during movement to prevent a temperature deviation and other possible effects that the placing of the guard board might inflict. The activation of the function is made by the control board and is communicated via a CAN-bus. The CAN-bus goes through a second board (BCM) to secure the termination of the bus.

3.2.4.7 Controls

The system has a number of control units allowing the user to control the movements and the functions of the system. There are three different types of foot controls and two types of hand controls.

Each control has two separate switches for the functions, operating safety critical movements. The separate switches shall be used for validation of the functionality of the control (validation performed by software).

The hand control is designed to support the functions with two separate switches (DMG). The control is structured by laminate, including domes, switch layer and a silk-screen layer, connected to a small PCB placed inside the aluminium profile.

The advanced hand control includes functions for controlling functions of the OTC. The signals used for controlling table functions are connected to CB-module used for supervising the table. This means that the signal wires, coming from the hand control are split up inside the table and connected to two separate modules.

3.2.4.8 Detector Holder, Table

The manoeuvre control, controls the detector carriage brake.

When the control is activated, the carriage is free to move and when released, the brake is activated holding the carriage in position. The brake is normally activated, at power loss the brake will release.

The detector carriage is designed to accommodate detectors and detector holders. The electrical design of the detector holder is made in the same manner, e.g. standard electronics are used for all detector/detector holder options and additional electronics are added to suit each individual option.

When using a fixed detector in the table, a power box for the detector is mounted underneath the table.

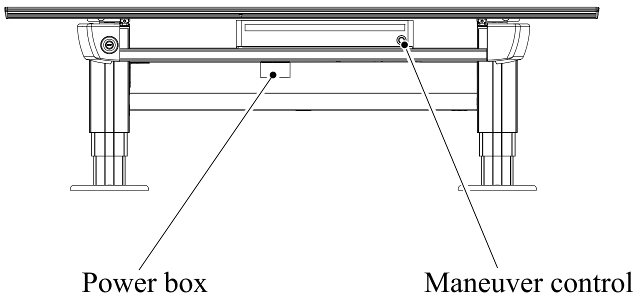


Fig. 3-1 Location of power box

3.2.4.9 System Nodes, Motorized, Vertical Movement

General

The system is divided into two logical subgroups. Each group contains several nodes, all with different responsibility and tasks. The difference between the two sub groups, is their emphasis of functionality.

The main priority of the control nodes subgroup is to act as a link to the surrounding world and to feed the system (other nodes) with input. The input of the control nodes are used to control and manage the nodes of the motor nodes subgroup. All data is passed through the master node, which main task is to supervise and control the system.

The task of the nodes in the motor nodes subgroup is to, based on the commands from the master node, move the system in different directions. Each motor node controls a specific axis (direction of movement).

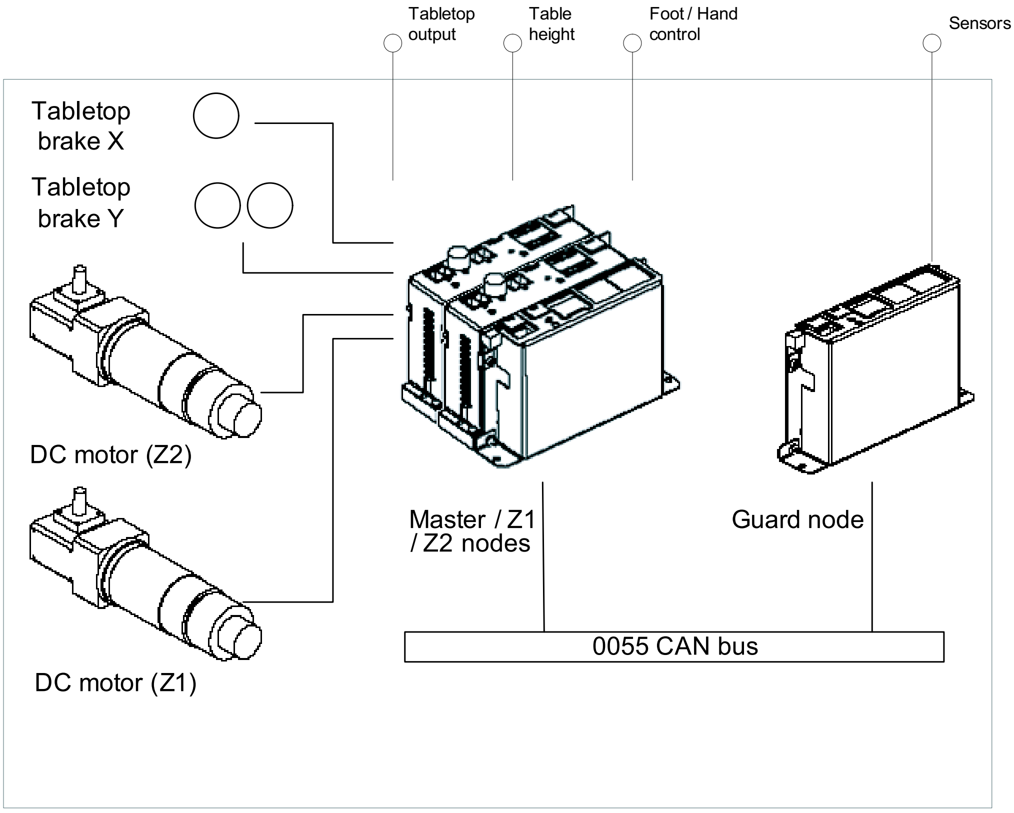


Fig. 3-2 System nodes

3.2.5 Wallstand

The wallstand has an internal power supply of 24 V. The internal power is divided into two circuits:

- 24V WS Power:

  Power to the Z brake
  Power to the armrest motor.
- 24V WS:

  Logical power to the relays.

The wall interface board (3.1WIB01) is prepared for system integration. The following signals can be used in a system (the end user is responsible for the compliance with IEC60601-1).

- Sync signals to the OTC system.
- System emergency stop circuit.
- Indicator light.
- Z potentiometer.

3.3 Mechanical Design

The system is mechanically designed to be ergonomic and at the same time robust.

3.3.1 Overhead Tube Crane

The OTC is designed to be extremely light and manoeuvrable. The OTC has five individual movable axis; X, Y, Z, Alpha and Beta (see Picture 1). All axis of the OTC are manually manoeuvrable except for the Z-movement (up/down).

All movements have mechanical end stops. The Alpha and Beta movements also have mechanical indexes to indicate fixed positions (-90°, 0° and 90°).

The Z-movement is strictly motorized and controlled via buttons on the handlebar. All brakes are electrical and controlled by a simple press of a button. All control buttons are placed on the handlebar, placed at the front of the X-ray tube. The control buttons for the collimator are placed adjacent to the handlebar, giving the operator a single access point. For a more detailed design description of the OTC.

3.3.2 Closed Table

The table is a high performance product, designed to cover most kinds of examinations and patient types. Maximum load is 295 kg.

The floating table top is manually moved, whereas the table Z-movement is motorized. The table top brakes are electrical, allowing the operator to control them with a simple press of a button.

3.3.2.1 Table Top Crash Guard

The table top crash guard shall only be primarily used as a safety precaution for the system. It will as well limit the risk of personal injury, although the crash guard does not guarantee patient protection.

To be able to detect a collision, four micro switches are placed between the table and the table top. If the table crashes into an object, the micro switches will stop the moment in the on-going direction, but it will allow the movement in the opposite direction. When the object is removed, the table can be moved in both directions again.

3.3.3 Two Column Table (option)

3.3.3.1 Power Supply Box

The power supply box contains electronics of the table and for external products such as power supply for detectors etc. the design allows electrical plates to be pre-assembled and attached as a whole into the power supply box.

All cables, used for installing the table is passed though a conduit, running from the head end foot plate to the power supply box.

3.3.3.2 Column

For the motorized solution the columns will consist of three segments. The mechanics and the electrical components are placed within each column. The concept of the mechanics includes a movable ball screw, ball nut, a safety nut and a mechanical brake. A motor rotates a cylindrical bracket that holds the ball nut. When the ball nut is rotated the ball screw is moved upward or downward dependent on the direction the ball nut is rotated. The brake operate on friction which means that an increase of load causes the brake force to increase. There is also an electrical brake at the motor axle.

3.3.3.3 Detector Holder

The detector holder is manually movable along the table top in the X-direction. The detector holder moves between two aluminium profiles that are attached to the table frame. The attachment of the detectors is adjustable to decrease the distance between the table top and the detector holder. The detector holder is normally locked via a magnet, locking against a steel plate inserted in the aluminium profile. The brake is controlled via a switch placed on a handlebar directly beside the detector holder. It can be supplemented with up to three mechanical indexes that are used for an easy positioning of the unit.

3.3.3.4 Controls

There are three different types of foot controls and two types of hand controls available as standard or as options. Each control has two separate switches for the functions operating safety critical movements. The separate switches shall be used for validation of the functionality of the control (validation performed by software).

3.3.4 Wallstand

The up and down movement of the wallstand can be both manually and motorized controlled. The movement is counter-weighted, allowing a manual movement with a very small applied force. For motorized movement the motor is connected to the shaft with a clutch, this is also to reduce the force for manual movement.

The tilting function is balanced in order to reduce the applied force. With a tilting function the detector holder can be set in any angle within a range of 90° to –20°. The detector holder is locked in position using a mechanical brake. To help the user to find the most frequently used positions, three mechanical indexes (90°, 0° and –20°) are implemented.

3.4 Functional Description

3.4.1 General

The functional design of the system is based on the fundamental requirements and values of the system. Functions of the system are intuitive. The system is intended to be easy to use without any extensive training and understanding of the functions of this particular system.

3.4.2 Description

The system is operated from interfaces inside the examination room and from the operating room. The exposure controls are placed at the display, and in the operating room whereas the positioning controls are placed in the examination room (lab). The basic idea is that the functions shall be operated from the position where they are needed, which will enhance the workflow and increase the efficiency.

3.4.2.1 Positioning Function Controls

The positioning of the system is performed inside the examination room, i.e. the controls for the positioning functions are also placed inside the examination room. All position controls use a "continuous activation technique" which basically means that the operator must press and hold the key to activate the function. On release, the function will be deactivated.

3.4.3 Image System

3.4.3.1 General

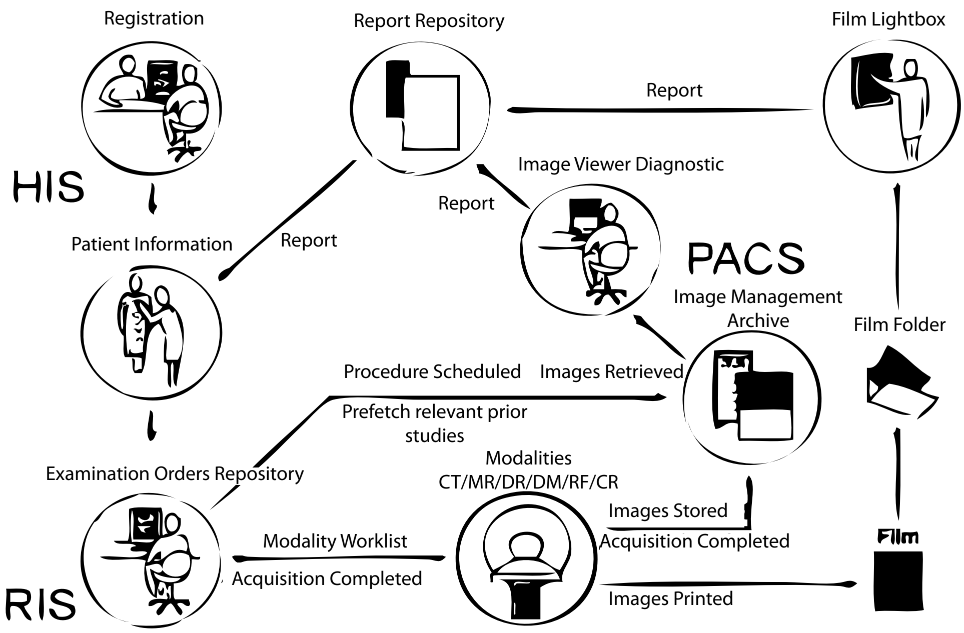


Fig. 3-3 Flow chart

3.4.3.2 Detector Configuration

Canon Fixed Solution

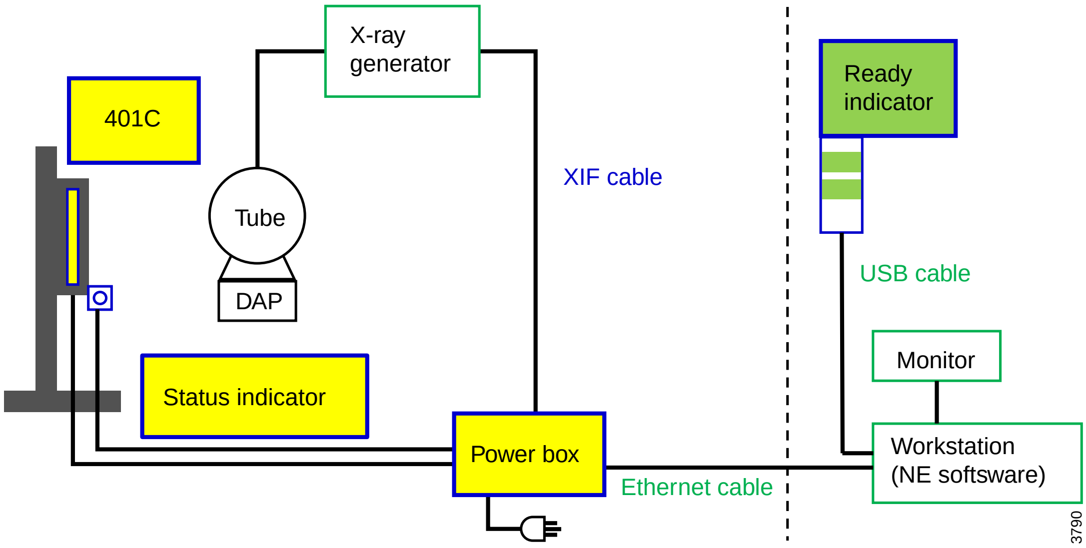


Fig. 3-4

Canon Wireless Solution

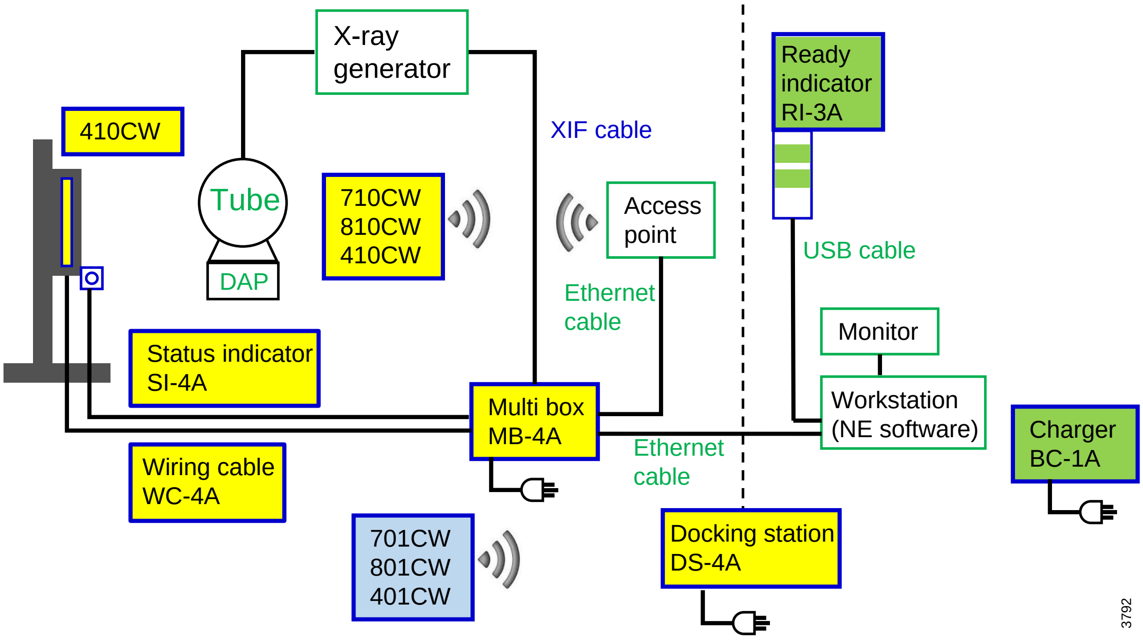


Fig. 3-5

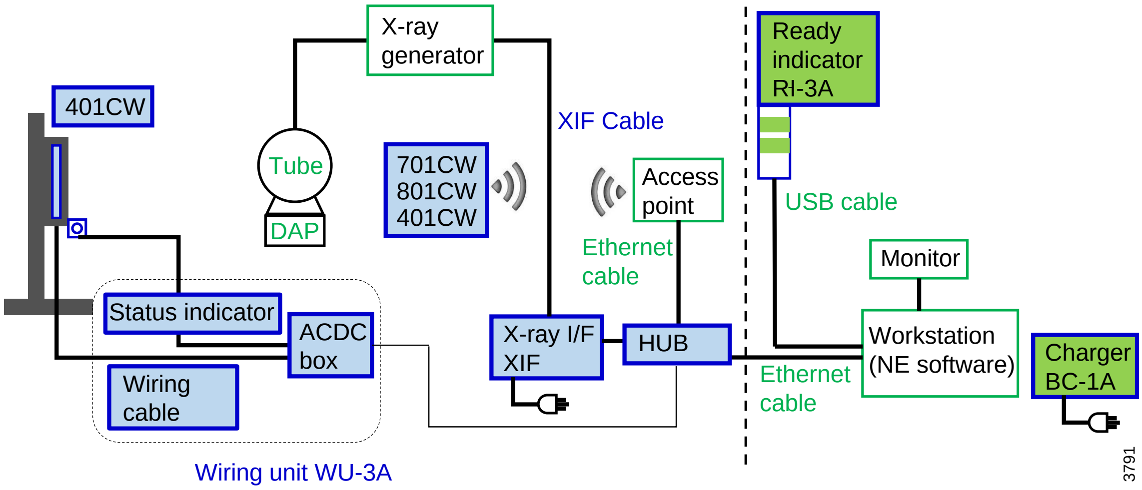


Fig. 3-6

3.4.4 Overhead Tube Crane

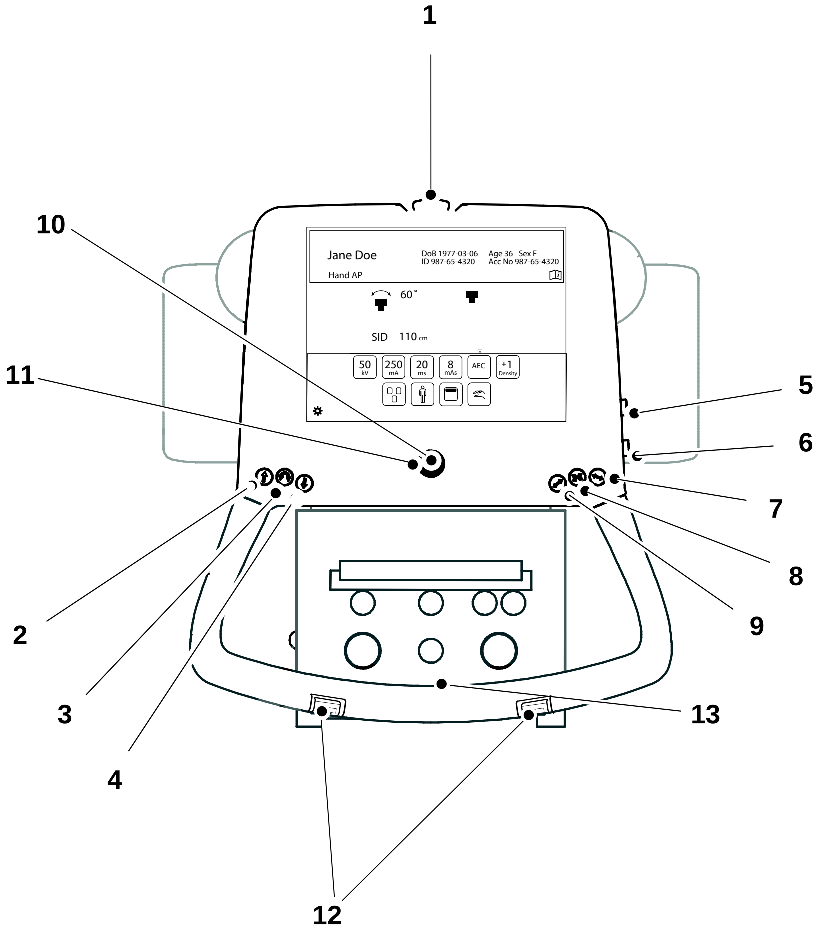


Fig. 3-7

1. *Emergency brake*
2. *Z-movement up*
3. *Alpha Beta rotation*
4. *Z-movement down*
5. *Z-movement up*
6. *Z-movement down*
7. *Unlock X brake*
8. *Unlock X and Y brake*
9. *Unlock Y brake*
10. *Indication light, tracking*
11. *Synchronization button, tracking*
12. *Z-movement, up/down*
13. *Handle frame (option): X-/Y-brake release button*

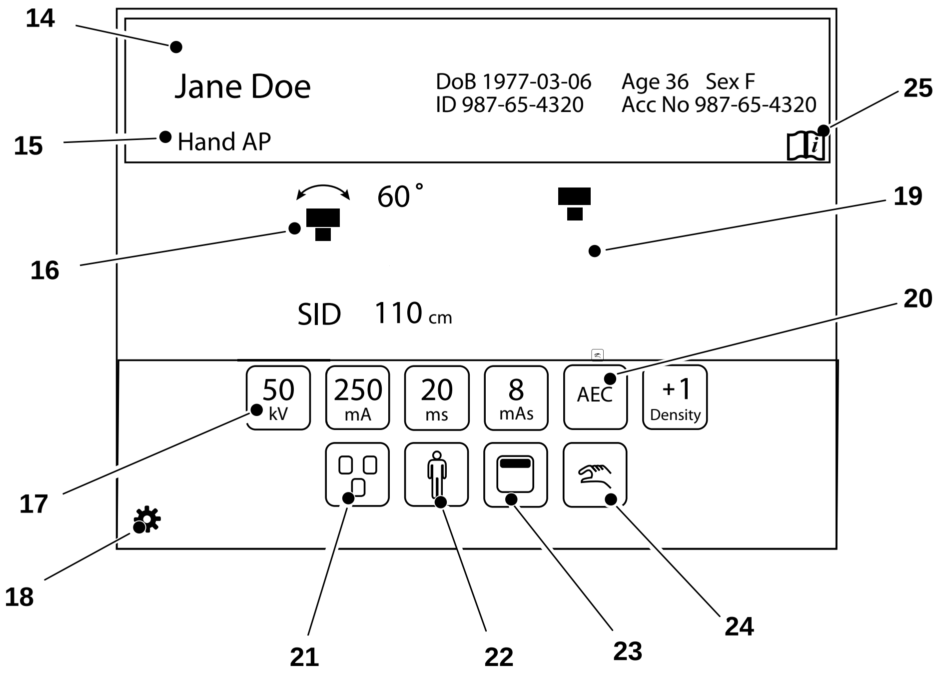


Fig. 3-8

14. *Patient information*
15. *Active protocol*
16. *Position information*
17. *Adjustment of generator parameters: kV, mA, ms, mAs, Density*
18. *Settings and Service menu*
19. *Active mode*
20. *Selection of Technique mode*
21. *Selection of active AEC field (AEC mode only)*
22. *Patient size*
23. *Collimator centering*
24. *Activation of wallstand or table tracking*
25. *Hospital method book*

3.4.4.1 Z-movement

The Z-movement in the overhead tube crane is strictly motorized and has a suspended mass of approximately 50 kg, depending on tube/collimator configuration. These two factors together generates a potential risk of injury on patients and operators, as well as a potential risk of damaging the system and/or its environment.

The system design minimizes this risk with a number of measures. The strongest of these measures is that the system is hardware supervised which removes the risk of unauthorized/ uncontrolled movements. This hardware supervision is realized via a hardware circuit that must be closed in order to allow downward movement below a specified height.

All movements, including the Z-movement, are considered to be safe above a certain height and as long as movement is performed outside the patient area. This later statement allows automatic movement below the safety height in some cases, such as tracking against a wallstand. Although the ceiling height may differ between 2500 and 3000 mm, the height is calculated to give a safety zone above the table top of minimum 300 mm.

Additional safety measures, in form of electrical switches on the Alpha movement, is included in the system, to secure that the system is in position for enabling tracking below the safety height. The system allows tracking below the safety height, if Alpha is positioned outside the range of +45° to -45°, although it requires an activation of the tracking function toward the wallstand.

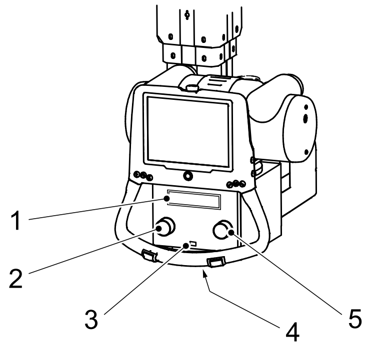
The activation of an automatic movement, i.e. a tracking movement, is performed by activating control buttons with a double switch feature. One switch is connected in series with the emergency stop circuit and the other switch is for enabling the tracking function. The switch connected to the emergency stop circuit is used as a safety measure (DMG, dead man grip) with a delayed activation function. The delay is necessary in order to maintain a controlled retardation of the movement when the control button is released. The time frame for the delay is set to < 1 sec. giving a maximum movement of 150 mm on release of the control button. Note that this switch shall be used as a measure in case of a single fault in the function switch and not as a "quick-stop" function.

Above all internal safety measures, the system includes a number of emergency stops that are connected in the same circuit, see **3.2.1.4 Emergency Stop Circuit, Page 59**.

3.4.4.2 Manual Collimator

The collimator, placed directly below the X-ray tube, is strictly manual and has the following functions:

- Collimator light ON/OFF
- Light field adjustment (width)
- Light field adjustment (height)
- X-ray filters



1. *Disc, X-ray filter type*
2. *Light field adjustment (width)*
3. *Collimator light ON/OFF*
4. *Measuring tape*
5. *Light field adjustment (height)*

3.4.4.3 Automatic Collimator Version (option)

Below is a description of the controls on the Siemens AL02 collimator.

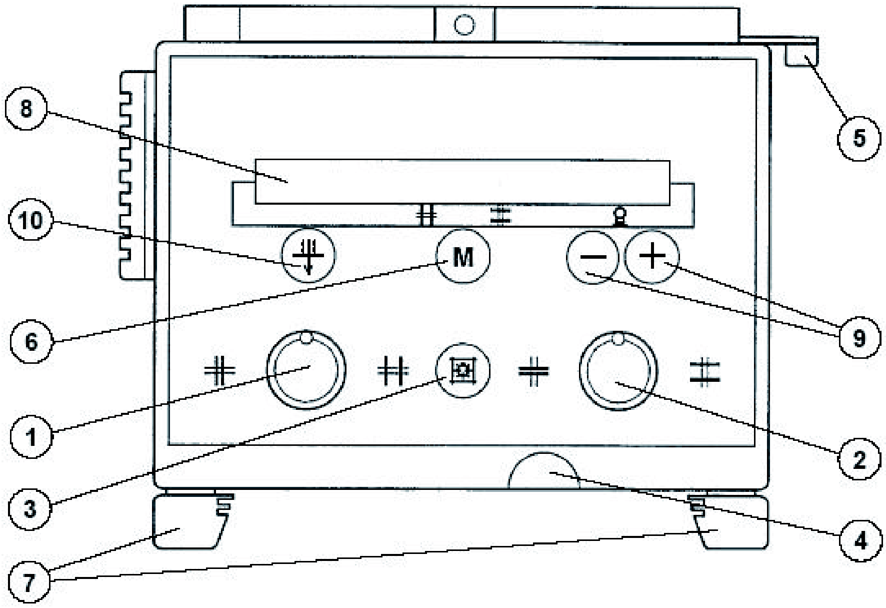


Fig. 3-9 Siemens AL02 collimator controls

1. *Adjusting knob for formatting height collimation.*
   (Turning to the left closes the collimator, turning to the right opens the collimator).
2. *Adjusting knob for formatting width collimation.*
   (Turning to the left closes the collimator, turning to the right opens the collimator).
3. *Button turns the X-ray field illumination and linear light localizing on/off. Cut-out is also performed automatically via a time switch.*
4. *Measuring tape grip for SID measurement - Take reading at bottom edge of multi-leaf collimator. - The measuring tape has both a cm— and an inch-graduation.*
5. *Detent lever for ±45° rotation of the collimator around the central beam axis. - The collimator only stops in the 0° position.*
6. *Button for changing between automatic and manual mode. A long activation (approximately 2 seconds) of the M button will set the light field to maximum size.*
7. *Two accessory rails.*
8. *Function display will indicate manual or automatic mode of the collimator.*
9. *Buttons for manual changing of SID. The new SID value will then be used for calculating the field size instead of the collimator default value, steps: 100, 115, 150, 180, 200.*
10. *Button for selecting collimator filtration.*

SID

Changing SID

The SID used for calculating the size of the light field can be changed manually with button no. 9 on the collimator.

The new SID value will then be used for calculating the field size instead of the SID *Collimator default value*.

Pre-programmed SID Values

If the SID values for each APR are pre-programmed at the image system user interface, this will override the *Collimator default value*.

3.4.5 Closed Table

The control of the table is placed on the lower part of the vertical lift as a kick box, foot control on the floor or a hand control (option). The controls are used for enabling and disabling of functions of the table.

3.4.5.1 Movements

The table can be moved in Z-direction for up and down movements and in X- and Y-direction for longitudinal and lateral movements.

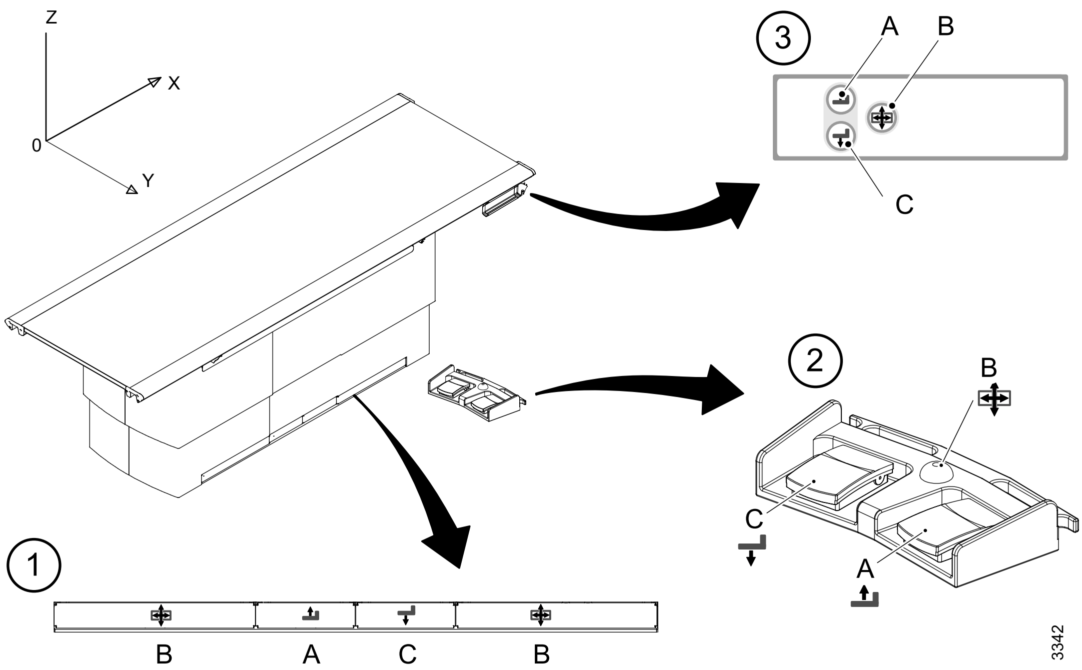


Fig. 3-10 Table controls

1. *Kick box control*
2. *Foot control*
3. *Manoeuvre hand control (option)*

Table 3-1

Pos.	Direction	Movement	Activation
A	Z up	Motorized	Press and hold the button to activate the movement. Release the button to stop the movement.
C	Z down		
B	X and Y lateral and longitudinal	Manual	Press and hold the button to release the break and to be able to move the table top. Release the button to activate the brake and the table top will be locked.

WARNING!

Risk of squeezing hazards.

The patients shall always have their extremities placed over the table top.

CAUTION!

Patients shall be outside the working area when operating any motorized movement.

CAUTION!

When turning on power, do not operate foot control, manoeuvre handle or kick box control. It may lock.

Moving the Table Top

To manually move the table top, release the brakes and use the hand grip rails located at the long sides of the table top.

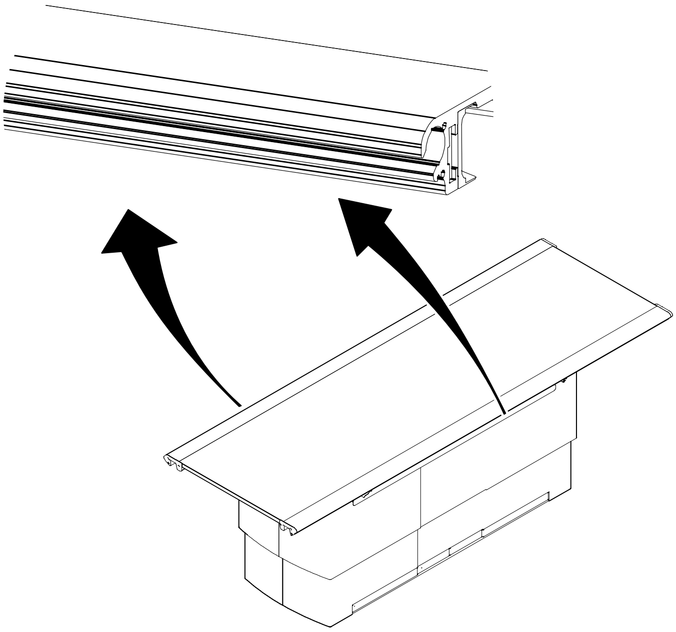


Fig. 3-11 Manually movement of table top

3.4.5.2 Detector Holder and Grid

Detector, table

Load the Detector

The instruction describes 14x17 and 17x17 detector.

The figures show 14x17 detector.

CAUTION!

Do not put any load on the detector tray. It might be damaged.

CAUTION!

Always supervise movements of the detector to avoid collision with peripherals.

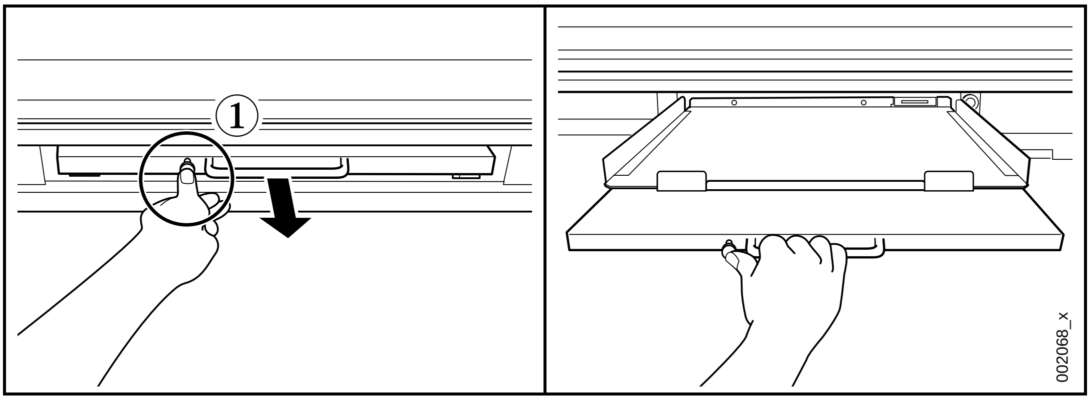
Note!

This instruction only applies to the portable detector.

1. Press the detector tray button and pull out the detector tray until it locks.

   Note!

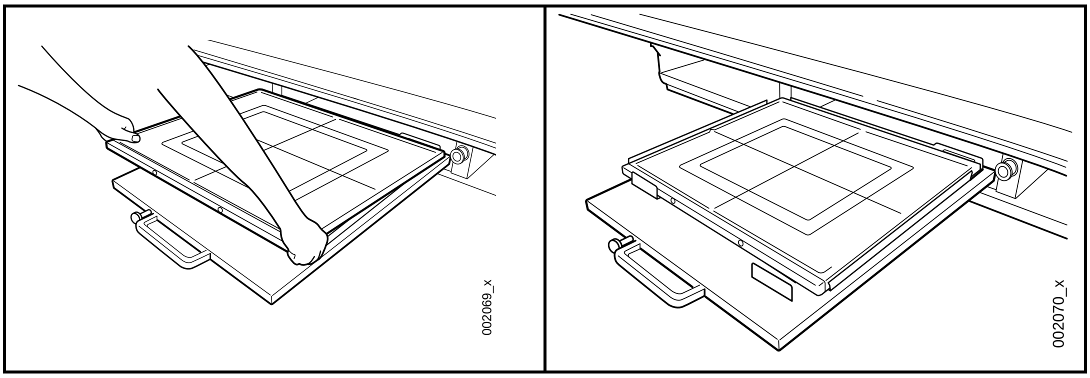
   The detector tray should be in locked position.



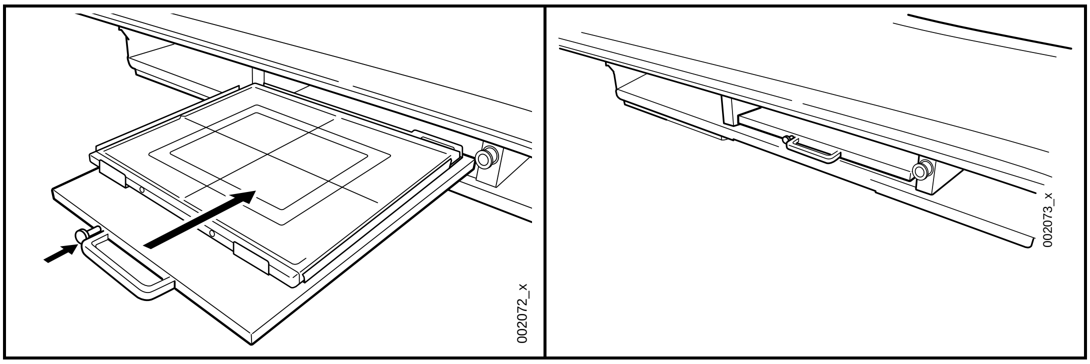
2. Insert the detector into the tray.

   Note!

   It is important to check that the detector is correctly inserted into the detector tray. An incorrect positioning will result in incomplete images.



3. Press the button of the detector tray and push in the detector tray into the detector holder.



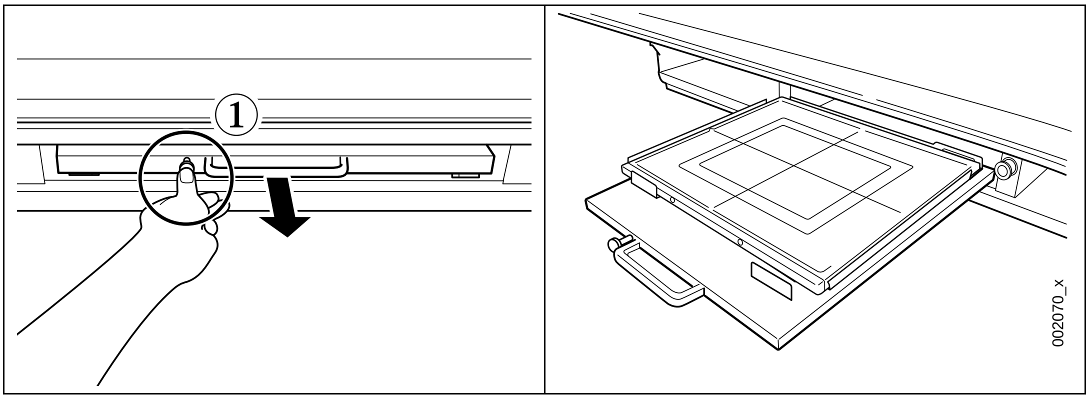
Rotate the 14x17 Detector

Changes between portrait and landscape.

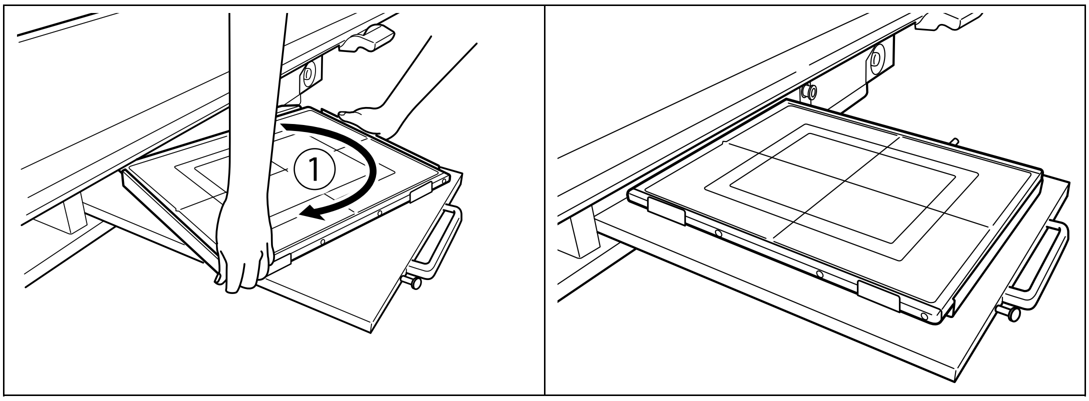
1. Press the detector tray button and pull out the detector tray until it locks.

Note!

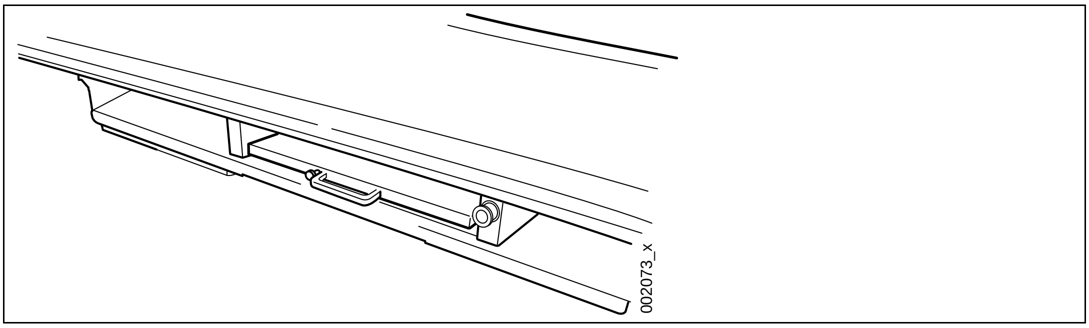
The detector tray should be in locked position.



2. Rotate the detector 90°.



3. Press the button of the detector tray and push in the detector tray into the detector holder.



Remove the Detector

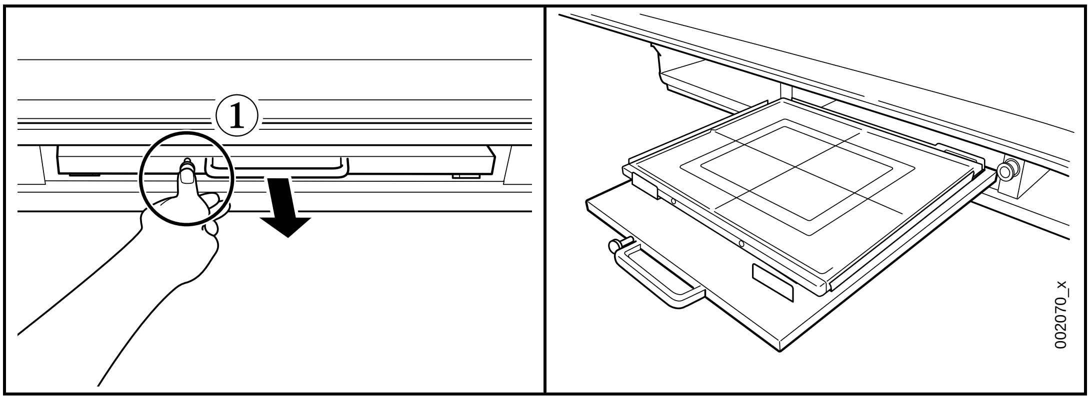
The instruction describes 14x17 and 17x17 detector.

The figures show 14x17 detector.

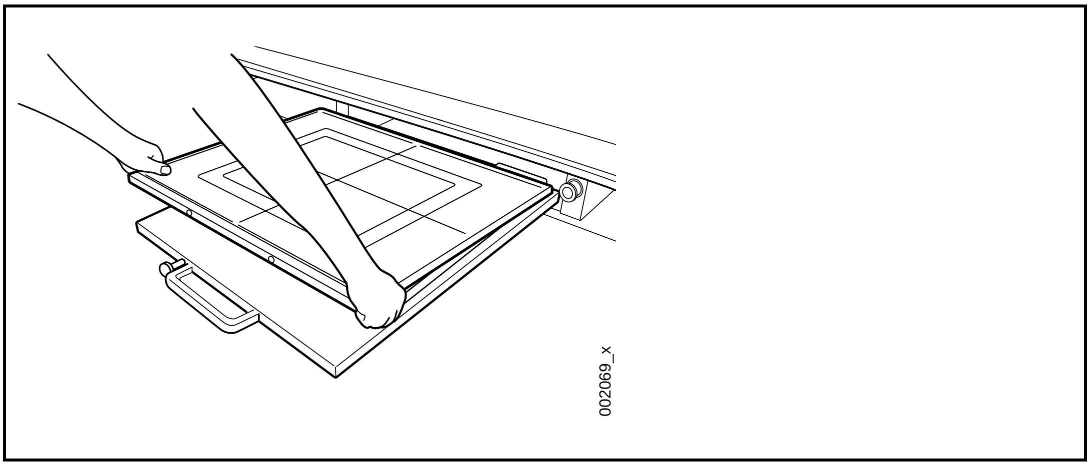
1. Press the detector tray button and pull out the detector tray until it locks.

Note!

The detector tray should be in locked position.



2. Remove the detector, lift and pull the detector towards you.



Grid, Closed Table

Remove Grid

1. Pull out the grid.

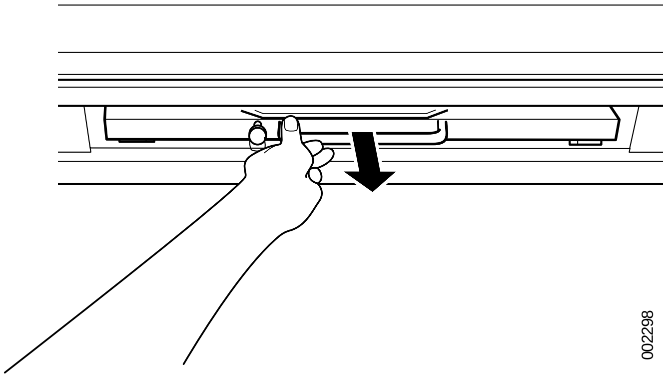


Fig. 3-12

Insert Grid

WARNING!

Failure to insert the grid in the correct orientation, with the tube side facing towards the X-ray source, can result in unsuccessful patient imaging.

Additional corrective patient imaging and additional ionising radiation exposure for the patient may be needed.

Ensure the grid is inserted in the correct way.

CAUTION!

Use the grid that is appropriate for exposure conditions (focus distance, etc.)

Hold the grid in both hands holding the metal on the sides of the grid, and insert the grid along the grid holder rail on the top of the detector tray.

CAUTION!

Properly insert the grid along with the rail. The device may be damaged if not mounted properly.

Note!

When mounting the grid, after confirming that right side is up, check to make sure that it is mounted correctly with the top surface towards you.

The top surface is the one with the sticker affixed to the metal handle of the grid surface.

1. Insert the grid with the tube side facing upwards, towards the X-ray source. The tube side of the grid has the specification label and the grid centre line identification.
2. Push in the grid, until it clicks.

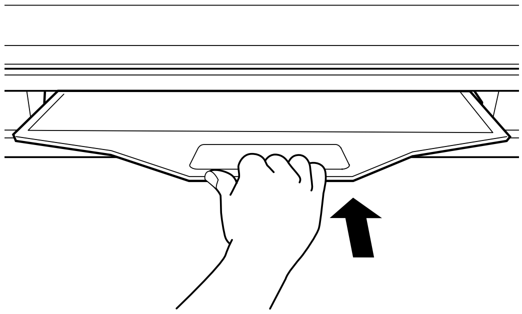


Fig. 3-13

3.4.6 Two Column Table (option)

The control of the table is placed at the handlebar installed on the table top and/or on the floor in form of a foot control (option) or a strip tape switch (option).

3.4.6.1 Movements

The control for the brake is placed on the right side of the detector holder. The controls are used for enabling and disabling of functions concerning the table. These functions are:

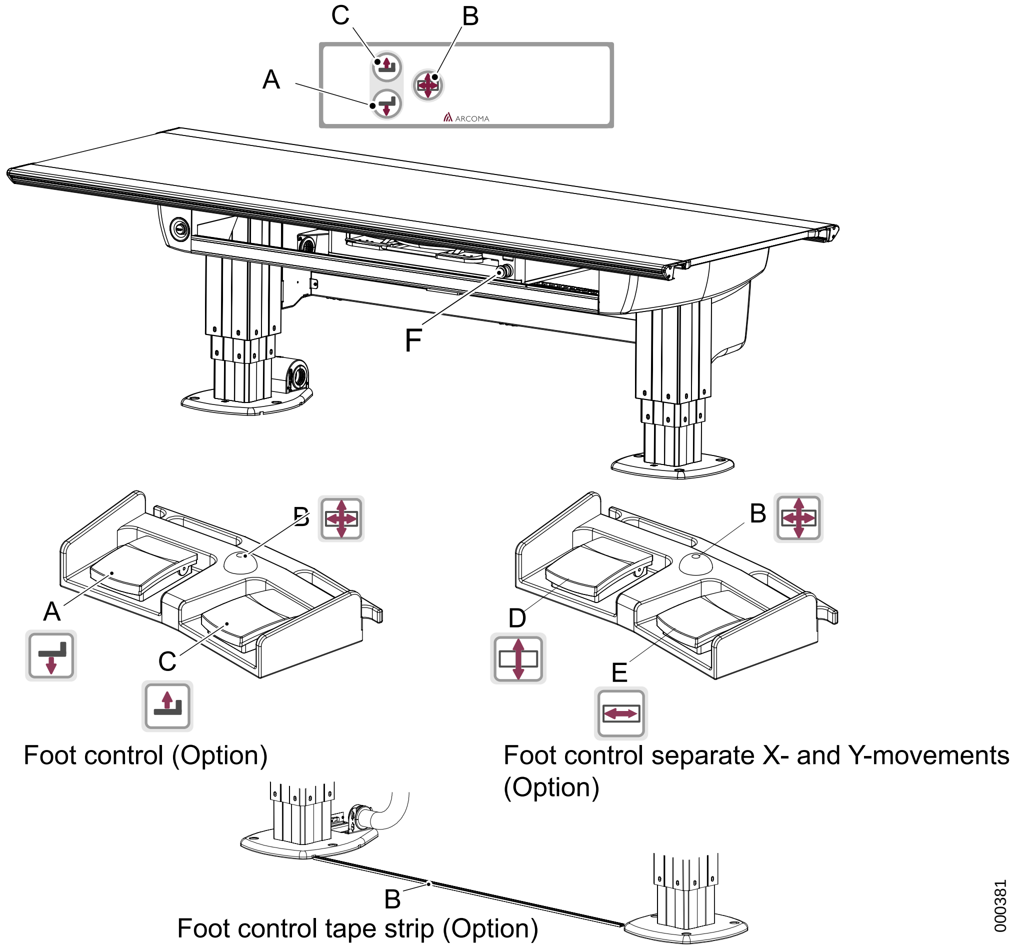


Fig. 3-14

A Move down

B Release/engage brakes of the table top (X- and Y-direction)

C Move Up

D Release/engage table top brake (Y-direction)

E Release/engage table top brake (X-direction)

F Release/engage detector holder brake

The table top release key (B) automatically lights the collimator lamp on activation. The collimator lamp is automatically switched off after a pre-defined time when the table top release key has been deactivated (released).

Note!

The collimator light is not switched on during vertical movement. The light is only for positioning of the patient and or the radiation beam.

The Up/Down function keys (A, C), also generally named movement keys, are also used for enabling movement of the overhead tube crane (Z-direction). This function is used when tracking is activated.

The user must keep the function key activated during the movement. When the function key is released the movement stops.

On activation of the Up/Down function keys an automatic movement of the OTC is allowed. The automatic movement is used for tracking the vertical movement of the detector.

The tracking of the table detector is only valid if the tracking is activated.

3.4.6.2 Grid, Two Column Table

See **Grid, Closed Table, Page 83**.

3.4.7 Automatic Collimator Control, Table (option)

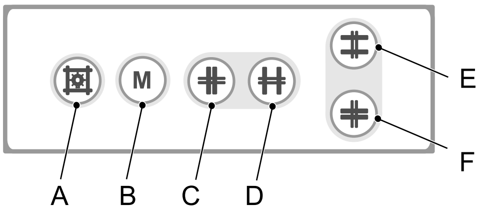


Fig. 3-15 Automatic collimator control, table

A. Button turns the X-ray field illumination and linear light localized on/off. Cutout also performed automatically via a time switch.
B. Button for changing between automatic and manual mode. A long activation (approximately 2 seconds) of the button will set the light field to maximum size.
C. Button for closing the format height collimation
D. Button for opening the format height collimation
E. Button for opening the format width collimation
F. Button for closing the format width collimation

3.4.8 Wallstand

3.4.8.1 Manual Wallstand

The wallstand can be delivered with two different detector holder wagons:

- Fixed detector holder wagon.
- Tiltable detector holder wagon.

The wallstand is manually moveable in the Z-direction. The movement is counter weighted, allowing a movement with a very limited force applied. The tilting function is also balanced in order to reduce the applied force. The detector holder can be set in any angle within -20° to +90°. The detector holder is locked in its position using a mechanical brake. There are mechanical index positions in 0° and +90° and a grade scale that displays the angle of the tilt in every 5th degree.

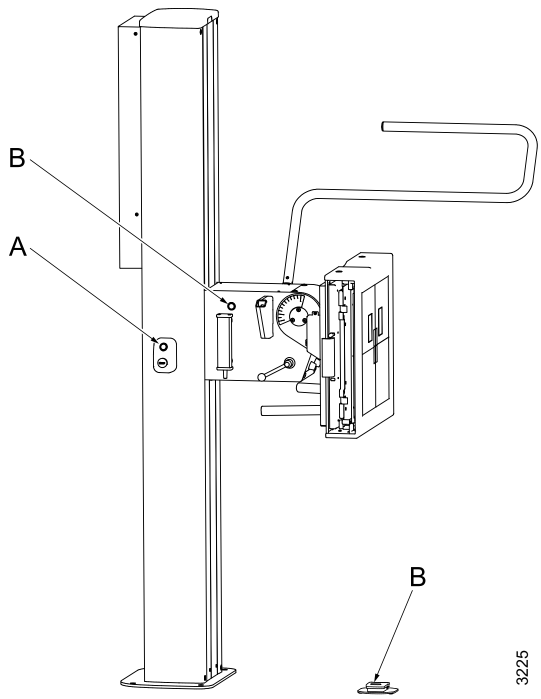


Fig. 3-16 Wallstand controls

A Tracking function key
B Release/engage brake (Z-direction)

Press and hold the button (A or B) to release the brake and push the wagon up or down.

Release the button (A or B) when the detector holder is in position and the brake will be activated and locked.

If tracking against the wallstand is selected, the brake (B) automatically lights the collimator lamp on activation. The collimator lamp is automatically switched off after a pre-defined time when the brake button has been deactivated (released).

WARNING!

Wheelchair patients shall always be placed outside the working area, when operating any motorized movement.

CAUTION!

Patients shall be outside the working area when operating any motorized movement.

WARNING!

If any item is removed from the wallstand, e.g. the detector or lateral armrest, the wallstand will become unbalanced.

When the brake is released, part of the wallstand will move upward and can cause injury.

The operation should be performed by trained personnel.

The brake (B) can externally be used for enabling movement of the OTC (Z-direction). This function is used when tracking is activated. On activation of the brake an automatic movement of the OTC is allowed. The automatic movement is used for tracking the movement of the detector and to synchronize (align) the X-ray tube and the detector.

The wallstand is also supplied with an additional synchronisation key (A). By pressing and holding this key tracking is initialized in order to align the X-ray tube and the detector. See also OTC, tracking function keys.

The tracking of the wallstand detector is only valid if the tracking is activated.

3.4.8.2 Motorized Wallstand

The brake button (B), is used for enabling movement of the OTC (Z-direction).

The brake button automatically lights the collimator lamp on activation, if wall tracking is selected and detector is moved. The collimator is automatically switched off after a pre-defined time when the brake button has been deactivated (released).

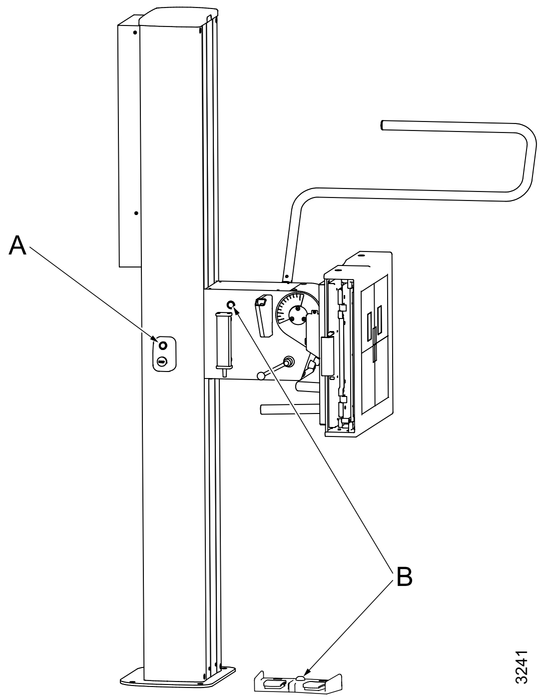


Fig. 3-17 Motorized Z-movement controls

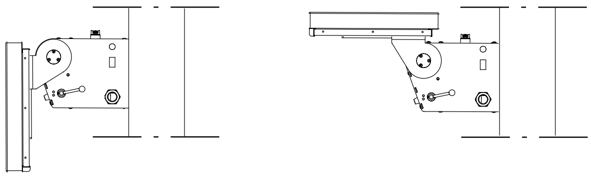
A. Tracking function key
B. Release/Engage brake (Z-direction)

On activation of the brake button, OTC tracking is allowed.

3.4.8.3 Detector, Detector Holder and Grid (Option)

Tiltable Detector Holder

The wallstand has an optional tiltable detector holder wagon. The wagon can make it possible to tilt the detector holder from 0° +90°. See index positions in the figure below

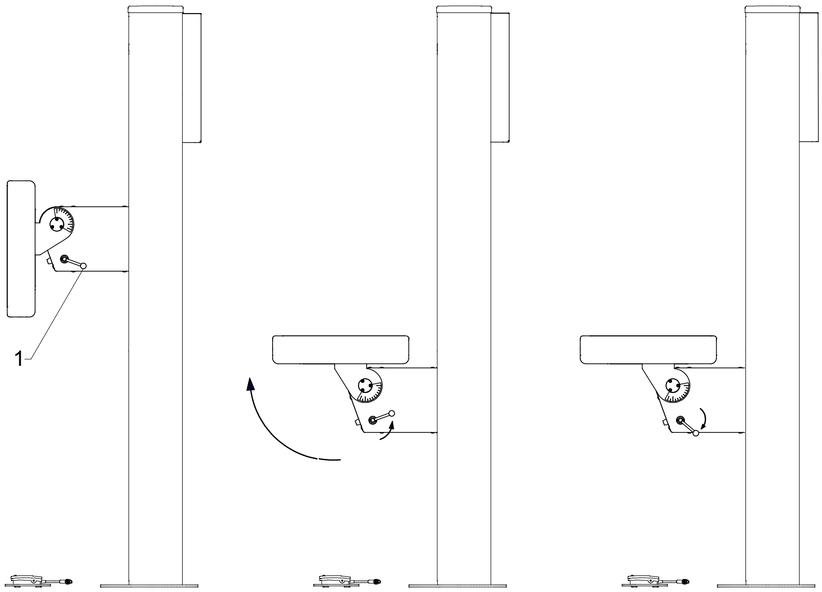


0° 90°

Fig. 3-18 Index positions

Tilt the Detector Holder

Turn the handle (1) up to unlock the tiltable detector holder according to picture B. Push the detector holder up in right position and then turn the handle down to lock the holder, see picture C.



A B C

Fig. 3-19 Tilting detector holder

Start Position of the Handle

CAUTION!

Squeezing hazards

- ***between the detector holder and other parts or devices when adjusting the angle of the detector holder.***
- ***for fingers when operating the detector.***
- ***for arm and fingers when operating the detector holder***

To position the handle in its start position, see pos.1 in **Fig. 3-19**.

1. Drag the handle out from the wagon
2. Turn the handle to the right position
3. Push the handle back toward the wagon

Detector, Wallstand

Load the Detector

The instruction describes 14x17 and 17x17 detector operated from the right side.

The figures show 14x17 detector.

WARNING!

If any item is removed from the wallstand, e.g. the detector or lateral armrest, the wallstand will become unbalanced.

When the brake is released, part of the wallstand will move upward and can cause injury.

The operation should be performed by trained personnel.

WARNING!

Always turn off the power and lock the main switch before service or maintenance.

WARNING!

Complete the setting of the counterweights before setting or adjusting of detector and other equipment.

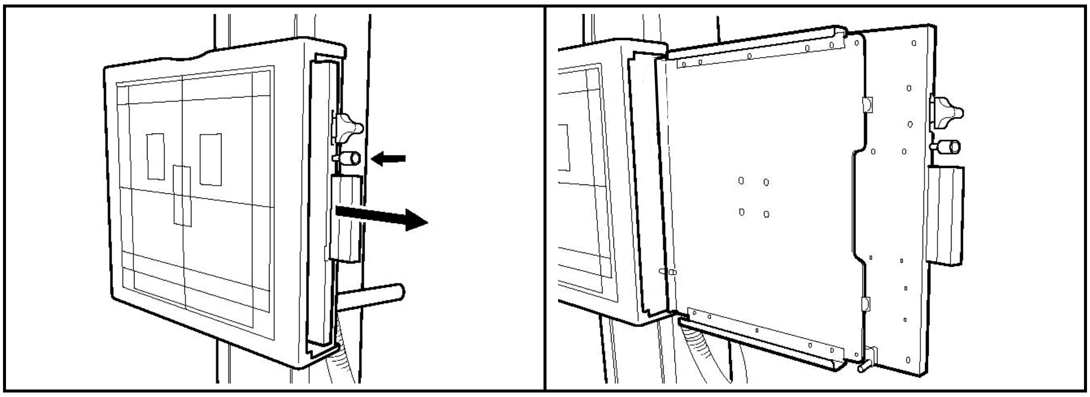
Note!

Depending on left or right operated wallstand, the location of the detector tray and position of button and latches is different.

1. Press the detector tray button and pull out the detector tray until it locks.

   Note!

   The detector tray should be in locked position.



2. Press down the latch and insert the detector into the detector tray until the latch locks.

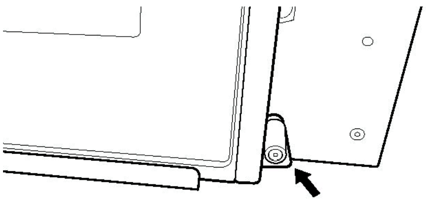
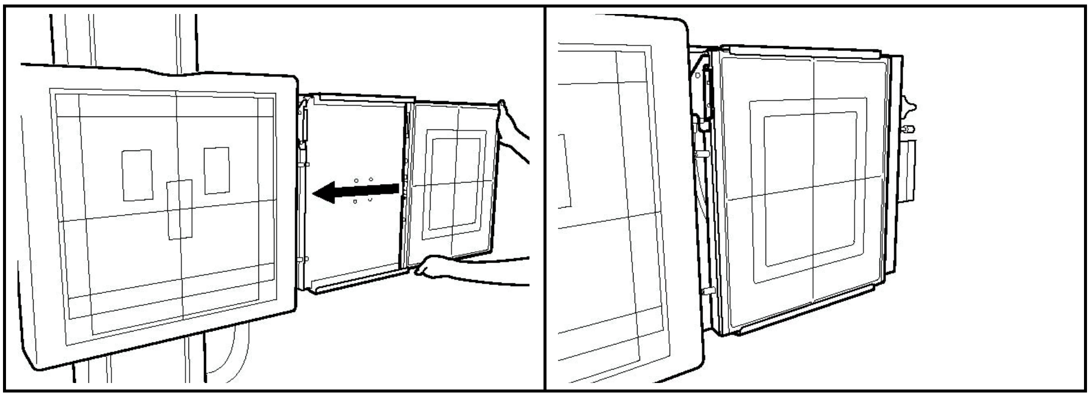


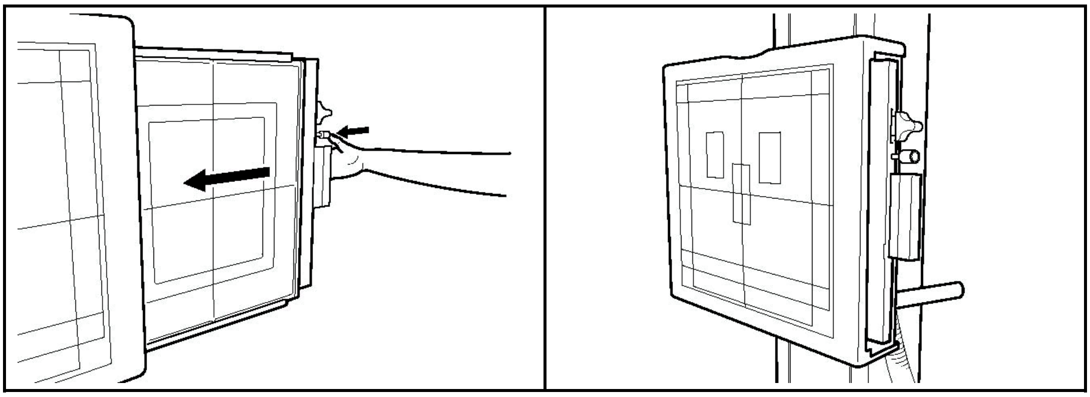
Fig. 3-20 Latch, detector tray



CAUTION!

Confirm that the latch locks.

3. Press the button of the detector tray and push the detector tray into the detector holder.



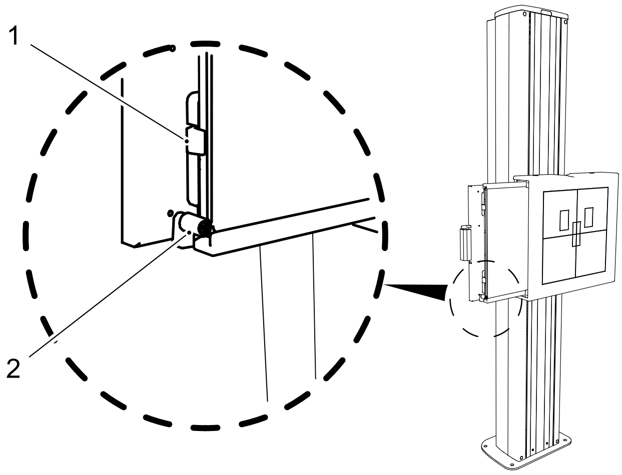


Fig. 3-21

4. Push the detector until the hooks (1) and the latch (2) lock.
   Chargeable detectors will start charging when set in this position.

CAUTION!

If the detector or the detector holder are not properly inserted, a warning symbol is shown on the display.

Wrong position of the detector or the detector holder leads to incorrect images.

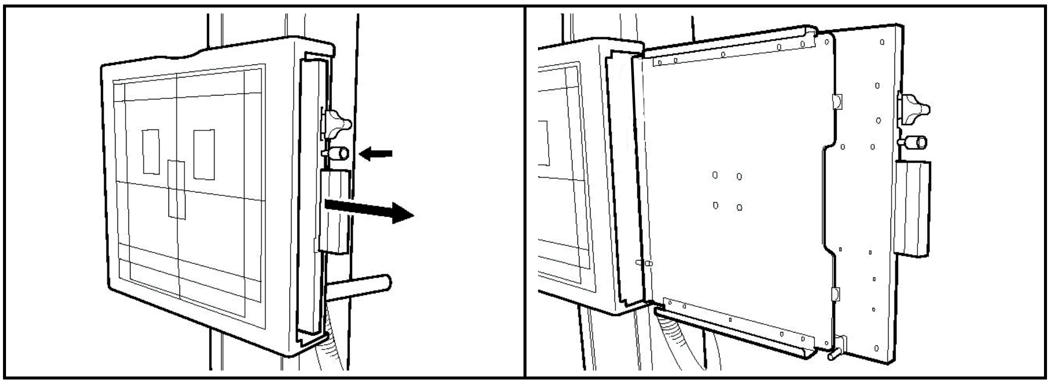
Rotate the 14x17 Detector

Changes between portrait and landscape.

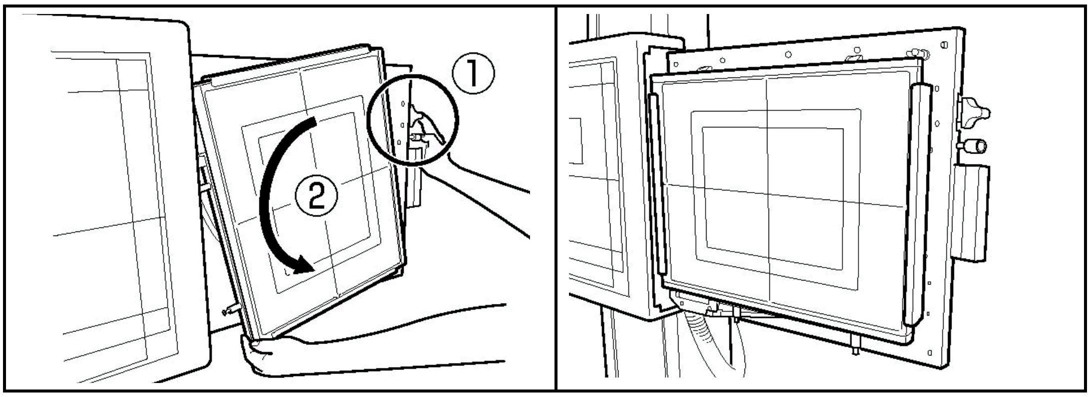
1. Press the detector tray button and pull out the detector tray until it locks.

   Note!

   The detector tray should be in locked position.



2. Hold the lower side of the detector, press up or down the latch (1) and rotate the detector 90° (2).



- To set the detector, pull the latch
  - upward at upper position of the tray.
  - downward at the center of the tray.

Note!

Depending on left or right operated wallstand, the location of the detector tray and position of button and latches is different.

Remove the Detector

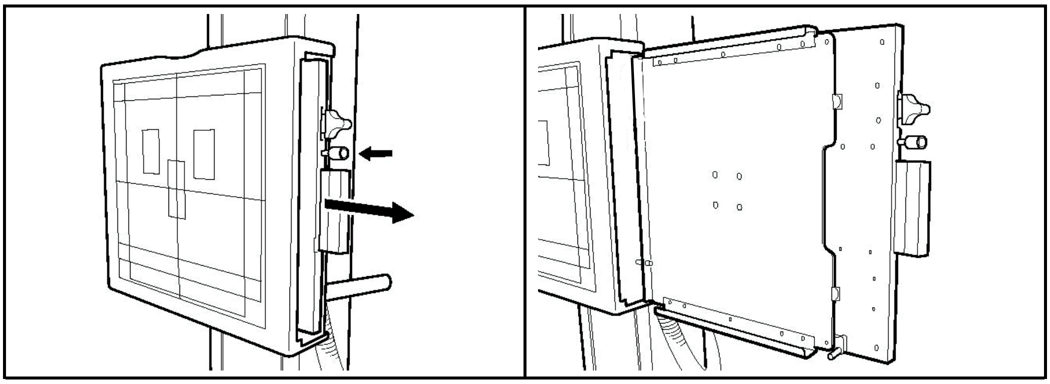
The instruction describes 14x17 and 17x17 detector operated from the right side.

The figures shows 14x17 detector.

1. Press the detector tray button and pull out the detector tray until it locks.

Note!

The detector tray should be in locked position.



2. Press down the latch and remove the detector.

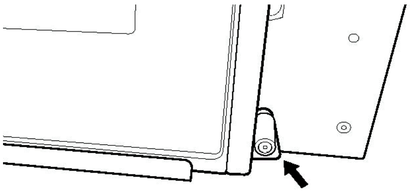


Fig. 3-22 Latch, detector tray

Note!

Depending on left or right operated wallstand, the location of the detector tray and position of button and latches is different.

3.4.8.4 Grid, Wallstand

Remove grid

1. Pull the grid in the direction of the arrow.
   Hold the metallic handle on the side of the grid.

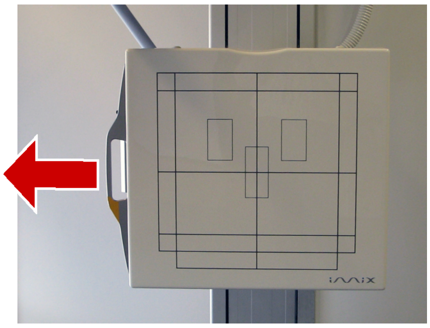


Fig. 3-23

Insert grid

CAUTION!

- ***Use the grid that is appropriate for exposure conditions (distance, etc).***

CAUTION!

Insert the grid along with the rail.

The device may be damaged if not mounted in properly.

Note!

The grid should be inserted with the top surface towards you.

The top surface has the sticker affixed to the metal handle of the grid surface.

1. Hold the grid in both hands, grip on the metal on the sides of the grid.
2. Insert the grid along the grid holder rail, on the top of the detector tray.
   Press in the grid until a click sounds. The grid is now properly in position.

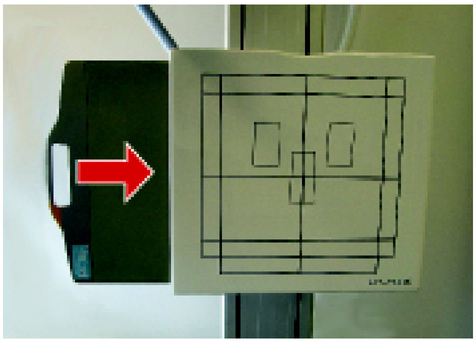


Fig. 3-24

3.4.8.5 Collimator Control Handle, Wallstand (option)

Note!

This function is only possible when connected to an X-ray system.

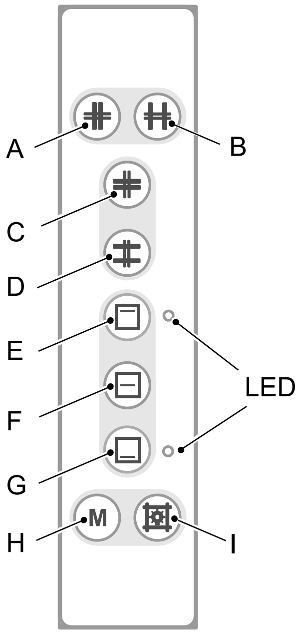


Fig. 3-25 Collimator control handle

A. Button for closing the format width collimation.
B. Button for opening the format width collimation.
C. Button for closing the format height collimation.
D. Button for opening the format height collimation.
E. Button for top centering of the collimator light field. LED indicating the selected position.
F. Button for middle centering of the collimator light field.
G. Button for bottom centering of the collimator light field. LED indicating the selected position
H. Button for changing between automatic and manual mode. A long activation of the M button set the light field to cassette size (based on the pre-programmed SID value).
I. Button for switching the light, the laser line and automatic mode on/off. The light and laser line is automatically switched off via a time switch.

3.5 System Techniques

The system has three different techniques which are described in this chapter. The functionality and features of the techniques is also described in this chapter.

Note!

The available techniques are depending on the actual configuration of the system.

The techniques in the system are:

- *Free technique*
- *Table tracking*
- *Wallstand tracking*

Table and wallstand tracking are both possible against a vertically and horizontally placed detector.

3.5.1 General User Interface

The alpha angle is always shown on the display.

In *Free technique* the height (H) is always shown. In *Table* and *Wallstand Tracking techniques*, the SID is shown toward a horizontally placed detector.

Against a vertically placed detector no height indication or SID is shown.

3.5.2 Free Technique

3.5.2.1 General Description

The *Free Technique* is the most basic mode in the system. The mode holds no special features or functionality. It is intended as a manual mode with a high level of freedom in positioning and exposure, e.g. for emergency examinations or examinations with the patient sitting in a wheel chair or lying in a bed. The *distance H*, shown in the display, is the distance to the floor.

3.5.2.2 Exposure Validation

Exposure is allowed (the interlock relay is closed) if the OTC is not moving and is operating properly (not in an error state).

3.5.3 Tracking

There are four different default tracking distances in the system, two for each tracking technique, i.e. *wallstand* and *Table tracking technique*.

The two types for both tracking techniques are against vertically and horizontally placed detectors.

These default distances are set during installation of the system. Which default tracking distance that is used depends on which tracking technique that is chosen on the tube holder and the angle of the X-ray tube. *wallstand* or *Table tracking* is selected from the display and an image at the display shows if the wallstand or the table is selected.

The synchronization button below the display, indicates the status.

CAUTION!

The user shall control if the tracking is activated, or not. This is done by checking if the synchronization button, at the wallstand or the OTC, is lit.

The light indication can be flashing or constant. The light indication will be constant if the system is in the correct position for tracking (normally default tracking distance) and flashing if it is not. If the light indication is flashing, there are two ways to get the system to its correct tracking distance.

1. Move wallstand or table (depending on which tracking is activated).
2. Push and hold the synchronization button at the wallstand or at the OTC.

Tracking movement is performed as long as the movement is activated on the tracked stand, i.e. wallstand or table, the OTC will move to find the correct distance and then continue to track at that distance.

If the tracked stand is already in the desired position, the synchronization button at the wallstand or at the OTC can be pushed and held to get the system to move to the correct position.

When the system has reached the correct distance for tracking, any manual movement on the tube holder (Z-direction) will change the tracking distance to the distance it is placed on when stopping the tube holder movement.

Moving the tube angle will affect the correct distance for tracking if it is moved across the -45° or 45° angle.

The correct distance for tracking is then set to the default tracking distance, since it has changed between horizontally and vertically placed detector.

Except for tracking against a vertically placed detector on the wallstand, tracking is always prohibited downward below the safety zone.

3.5.3.1 Synchronization Control/Tracking

The automatic tracking is activated at the display.

Activation of the synchronization button will drive the OTC to the position for tracking.

The activation will lead to a synchronization and tracking between the tube holder and the detector.

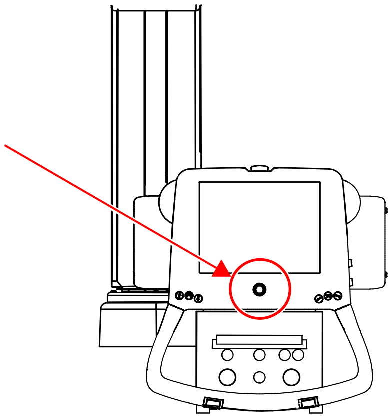


Fig. 3-26 Synchronization button with indication light – Display

The synchronization button at the display, also comprises a yellow indication light. This light indicates if there is an alignment.

- Permanent yellow light – indicates; *Alignment*.
- Flashing yellow light – indicates; *No alignment*.

3.5.3.2 Table Tracking Technique

General Description

The *Table tracking technique* is intended for examinations against a table.

In this technique the tube holder will track the movements of the table to assist the operator to always keep the distance to the detector.

Table Tracking

The tube holder can track the table detector in two different positions depending on if the detector is placed vertically or horizontally.

The system decides which way, depending on the angle of the X-ray tube.

If the angle is between -45° and +45°, the detector is assumed to be horizontally placed and thereby the default tracking distance for a horizontally placed detector is chosen.

The SID is shown on the display.

If the angle is outside -45° to +45°, the system assumes that the detector is placed vertically and thereby the vertical default tracking distance is chosen.

No SID or height is shown on the display.

The default tracking distances are set during installation of the system.

Note!

In table tracking technique, the exposure is blocked whenever a wallstand workstation is chosen on the generator.

Table Synchronization

At table synchronization, a predetermined collimator height is set. When tracking, the OTC will seek the determined height.

If the distance: collimator – table, differs from the predetermined, the yellow indication light at the OTC, will flash.

Activate the synchronization button at the OTC, and the OTC will move to the determined SID.

When synchronized, the indication light will stop flashing and shine with a permanent yellow light.

3.5.3.3 Wallstand Tracking Technique

General Description

The *Wallstand tracking technique* is intended for examinations against a wallstand.

In this technique the tube holder will track the movements of the wallstand to assist the operator to always keep the correct position to the detector.

Wallstand Tracking

The tube holder can track the wallstand in two different positions depending if the detector is placed vertically or horizontally.

The system decides which way depending on the angle of the X-ray tube.

If the angle is between -45° and +45° the detector is assumed to be horizontally placed and the default tracking distance for a horizontally placed detector is chosen.

The SID is shown on the display.

If the angle is outside -45° to +45° the system assumes that the detector is placed vertically and the vertical default tracking distance is chosen.

No SID or height is shown on the display. The default tracking distances are set during installation of the system.

Note!

In wallstand tracking technique, the exposure is blocked whenever a table workstation is chosen on the generator.

Wallstand Synchronization

WARNING!

Before performing any wallstand tracking, assure that the wallstand indication light is lit and thereby, that the wallstand is activated.

At wallstand synchronization, the collimator reticle shall be aligned with the detector cross.

When performing fast or long movements of the wallstand detector, it may occur that the collimator does not synchronize with the wallstand detector. The automatic wallstand tracking may not make it all the way and the indication light will start flashing.

In this case, activate the synchronization button at the wallstand.

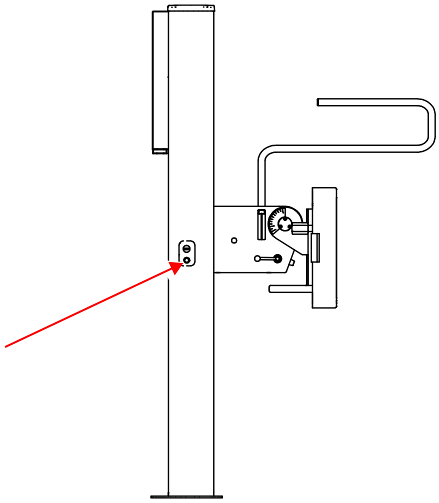


Fig. 3-27 Wallstand synchronization button

Then the tracking will carry out the full movement and synchronize. The indication light will shine permanently.

3.5.3.4 Tracking (Horizontal/Vertical)

Tracking Operation When Horizontal

- For the detector holder of the table when the *Table icon button* is active:
- When the *Wallstand icon button* is active and the detector holder of the wallstand tilt model is positioned at 90°:

  Tracking operation is only performed when the alpha angle of the display is between +45° and –45°. When performing horizontal tracking of each device, check that the alpha angle display is within the above range.

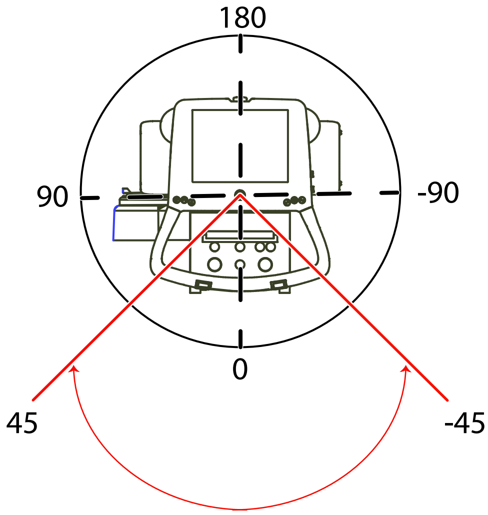


Fig. 3-28 Tracking operation when horizontal

Tracking Operation When Vertical

- For the holder of the wallstand when the *Wallstand icon button* is active:
- When the *Table icon button* is active and when using the vertical on the table:

  Tracking operation is only performed when the alpha angle of the display is between +46° and +134° and between 46° and 134°. When performing vertical tracking of each device, check that the alpha angle display is within the above range.

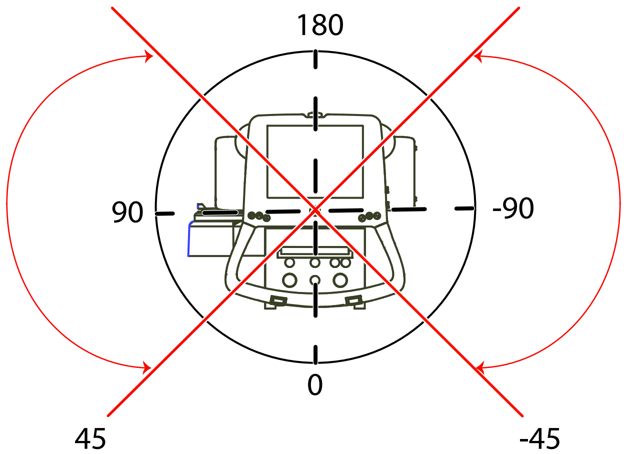


Fig. 3-29 Tracking operation when vertical

3.6 Software Design

Architectural Goals and Constraints

Basic Concepts

The system is built with a number of separate subsystems, acting as individual units in the system. The different subsystems are:

- *The high voltage generator*

  Responsible for the emission of X-rays.
- *The cabinet*

  The interface between the image system and the generator.
- *The overhead tube support*

  Responsible for handling of the ceiling support. Important functions for this sub-system are, moving Z up/down, X, Y, Alpha and Beta, tracking of table and wallstand and as a last function to inform the user about System status.
- *The wallstand*

  Responsible for holding the detector for chest examinations. Also possible to move the detector in Z and tilt direction.
- *The table*

  Holding the detector and a patient. Moving the table up/down, detector and handling of a brake for the table top.

4 Installation

4.1 General

This chapter describes how to unpack and install the product.

Follow the instructions given in this chapter.

After completing the installation, fill in the Installation report and send it back to Arcoma. If not, the time of guarantee will be considerably reduced.

Note!

Surrounding equipment, that is not the manufacture equipment, shall follow the standard IEC 60601-1-2 regarding electromagnetic compatibility.

Note!

It is the responsibility of the one who combines the Product with other equipment, to secure that the use of the combination is in compliance with MDR 2017/745 EU or other directives that may be mandatory on the market in question.

Note!

For information about installation location, space and transfer, see the product Planning Guide.

4.2 Precautions, Installation

WARNING!

Do not switch on the power, before the cabling is checked for damage, completely installed and connected according to the installation chapter.

WARNING!

High voltage!

Risk of serious personal injury or death!

Only trained service technicians may install, service and maintain the system.

No unauthorized personnel may remove any covers.

WARNING!

Always turn off the power and lock the main switch before service or maintenance.

WARNING!

Risk of electrical shock.

If covers are removed, live parts are exposed.

WARNING!

Do not touch the power line while performing work, such as voltage measurement, that requires the power supply to be turned ON.

WARNING!

Check protective earth after installation or service operations.

The system must be grounded in the system cabinet according to the installation and service manual.

WARNING!

Rotating parts can cause injury.

Do not get caught in a motor or other driving parts.

WARNING!

Squeezing hazard.

When removing the detector holder, secure the counter weight wagon to the main unit frame.

WARNING!

Remaining energy may exist when the equipment is switched off.

Wait at least 15 seconds before working on the system.

WARNING!

Be aware of possible squeezing hazards when the covers are removed.

CAUTION!

Danger or risk for injuries if installation instruction is not followed.

CAUTION!

Pay attention to power supply frequency, voltage, and current during installation of the system.

CAUTION!

ESD (Electrostatic Discharge) can damage electronic parts.

Use ESD protection when handling ESD sensitive parts.

CAUTION!

Do not use any flammable or explosive gases near the device.

CAUTION!

All mains supply cables are allowed to be changed only by engineers trained by supplier.

CAUTION!

Check that screws and bolts are tightened after installation and service.

CAUTION!

If the power supply voltage is unstable and falls by 10% or more compared to the specified voltage, internal devices malfunctions may result in unsuccessful X-raying.

CAUTION!

Set the closed table in service performance position during installation and maintenance.

CAUTION!

The table automatically lowers if not in use for a long period of time.

Do not place objects under the table.

If lowering is more than approx 10 mm/day, please contact service personnel.

CAUTION!

Be aware of sharp edges when the covers are removed.

Note!

Follow the installation instructions regarding the isolation for a safe and reliable function of the system.

Note!

The insulation kit is designed to isolate system components, e.g. system cabinet, table, wallstand and OTC, from the hospital building.

The insulation kit will prevent stray currents from reaching the system e.g. via screw attachments. Stray currents can be present e.g. in reinforcement bars or in water pipes in a building. These currents can be of several hundred amperes and can affect the leakage current from the system to the patient and thereby the safety for patient and user. Stray currents in the building shall be regarded as a failure in the building but the insulation kit provides an extra safety barrier.

The insulation kit will also prevent unwanted ground loops due to e.g. electrical contact through the wall or floor lead X-ray shielding via screw attachments of the system components.

4.3 Tools Required

- Standard hand tools and service tools
- Tools for unpacking
- Dynamometer (0–400 N)
- Torque wrench (15–47 Nm)
- Multimeter
- Medical electrical safety analyser
- Radiation meter
- Digital water level
- Rotation laser
- Allen keys (metric)
- Steel straight
- Hammer drill
- Lift
- Leakage current tester for measurements according to IEC 60601-1
- Assorted cable ties
- Protective ground wire tester for measurements according to IEC 60601-1
- Installation tool
- Loctite 243
- Tape
- Service PC (Windows 7 or later)
- Service cable (see **12 Spare parts, Page 531**)
- Working gloves
- Circlip pliers for external circlips

Fig. 4-1

- Allen keys

Fig. 4-2

4.3.1 Service PC

System requirements:

- Windows 7 or later
- 100 Mbyte free disk space
- USB port
- RS232 port or USB-RS232 converter
- Microsoft. NET 2.0 + SP1

4.4 Tightening Torque

At installation, all screws shall be tightened with the moment (Nm) shown in the table below, according to ISO 898-1.

10% deviation is permitted.

Table 4-1

Nominal thread diameter		Screw material Iron/steel				
	Hardness rating	4.6	5.8	8.8	10.9	12.9
M3		0.46	0.77	1.2	1.7	2.1
M3.5		0.73	1.2	1.9	2.7	3.3
M4		1.1	1.8	2.9	4	4.9
M5		2.2	3.6	5.7	8.1	9.7
M6		3.7	6.1	9.8	14	17
M8		8.9	15	24	33	40
M10		17	29	47	65	79
M12		30	51	81	114	136

4.5 Shipping/Receiving

4.5.1 Unloading

CAUTION!

Secure a proper equipment transfer route before unloading the system.

Two persons should cooperate when unloading the equipment.

4.5.2 Receiving

Verify that the site is ready for installation.

Remove the tops and the sides of the crates.

Inspect the equipment for transport damage immediately upon arrival at its destination. If there is any damage, save the packing material and notify the transport company at once.

To determine whether the complete shipment has arrived, compare items received to those listed on the shippers packing list and the Manufacturer order.

Any discrepancies should be reported to:

ARCOMA AB
Annavägen 1
SE-352 46 Växjö
Sweden

Phone +46 (0)470 70 69 70

4.5.3 Storage Precautions

CAUTION!

Store the system where atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, salt, or air containing sulphur will not adversely affect the equipment.

CAUTION!

Do not place the system on angled surfaces, expose it to vibrations, shock (including during transportation) and other factors that may impair stability.

4.5.4 Return Authorizations

Goods returned for credit, exchange or repair will not be accepted by the manufacturer unless written authorization has been issued. Contact manufacturer at the above address for return authorizations.

4.6 Mechanical installation of OTC

4.6.1 Ceiling Rails Y

Check that needed fixation point are present in the ceiling.

The ceiling must be free from hanging and extruding objects. The overhead tube support is moving and requires free space.

Spread the pre-installed fixation blocks on the ceiling rails Y, with the same distance (A) as the fixation points in the ceiling.

The distance (A) between the fixation points depends on the length of the ceiling rails Y.

Note!

The overhead tube crane rails shall be parallel ±1 mm.

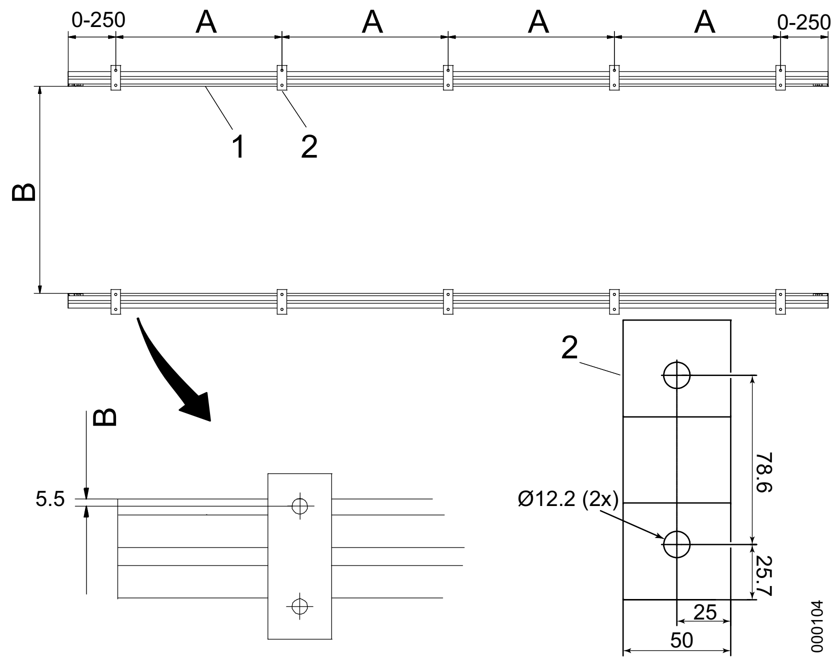


Fig. 4-3 Ceiling rails Y

1. *Ceil suspended unit rails (Y)*
2. *Fixation block*

Table 4-2

Length traverse rails Y	3000 mm	2748 mm (low ceiling)
Length ceiling rails Y	4000 mm	3748 mm
Minimum number of fix points / Y rail	5	5
Measure A	850-1100 mm	850-1100 mm
Measure B	1800-2200 mm	2778 mm

Lift up the ceiling rails Y and bolt the fixation blocks into the Unistrut or similar with the enclosed M10 screws and washer. Also install the insulation plates and cases on the fixation blocks, see figure below.

The ceiling rail Y must be level in X, Y and Z direction ±1 mm. If not use the enclosed shims.

The distance (B) between the ceiling rails Y is depended on the length of the traverse rails X, see **Fig. 4-3**.

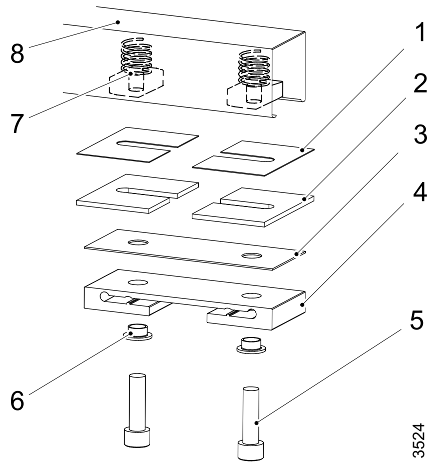


Fig. 4-4 Mounting ceiling rail Y

1. *Shims*
2. *Shims*
3. *Insulation plate*
4. *Fixation block*
5. *Installation screw*
6. *Insulation case*
7. *Spring channel nut*
8. *Unistrut rail*

4.6.2 Measure Isolation between Hospital Protective Earth and Y Rail

1. Check the resistance between the hospital protective earth and one of the Y rail installation screws.

   Use a visual or audible device (Ohmmeter, buzzer, etc.) to indicate protective earth continuity.

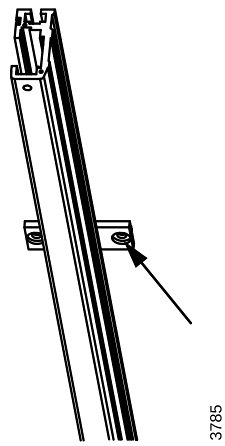


Fig. 4-5

2. The resistance value must be ∞ Ω.

   If any resistance is measured, there is a connection between one of the installation screws and the hospital protective earth.

The connection to the hospital protective earth must be removed before continuing.

– Check the mounting of insulation plates and insulation cases, see **Fig. 4-4**.
  If all seem to be correct:
– Remove the bolts, one at a time and measure until the connection is found.

4.6.3 Traverse Rail X

Note!

One of the traverse rail X contains a steel bar for the brakes. See the room layout to know the orientation of the steel bar for the brakes in the room.

Loosen the screws (4) and push on the flat bar (3), with the distance plate (2), onto the traverse rail X (1) according to figure.

The distance (B) between the distance plates is depended on the length of the traverse rail X, see **Fig. 4-3** and **Table 4-2**.

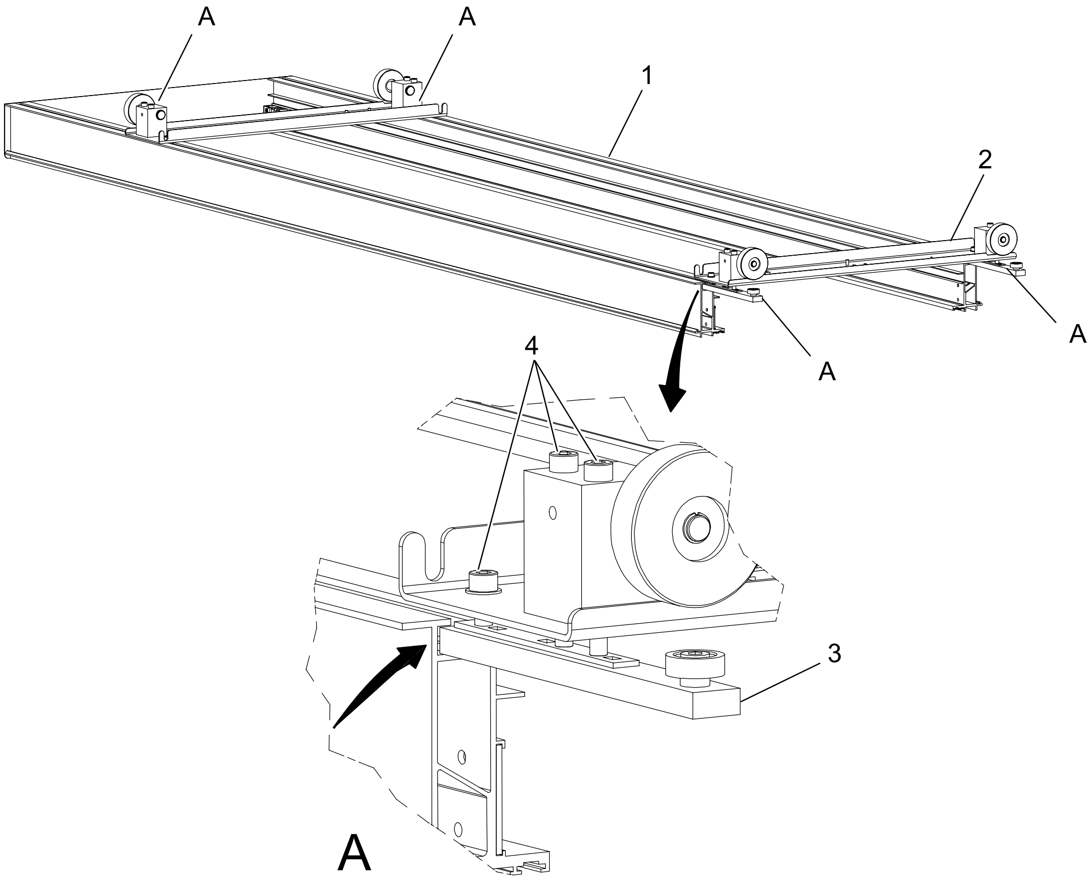


Fig. 4-6 Traverse rails X

1. *Traverse rail X*
2. *Distance plate*
3. *Flat bar*
4. *Screws*

See figure below for the distance between the traverse rails X.

The traverse rails X must be parallel in X direction ±2 mm.

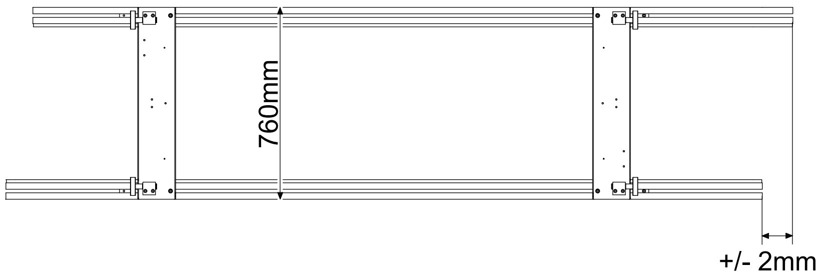


Fig. 4-7 Distance between traverse rails X

Install the end covers on the traverse rails X.

Fig. 4-8

Before installing the traverse rails X, check that the steel bar for the brakes is placed in the correct traverse rail X.

The placement of the steel bar for the brakes depends on the orientation of the ceiling wagon to secure the function of the brake X.

The steel bar for the brakes has to be placed on the same side of the ceiling wagon as the brake X.

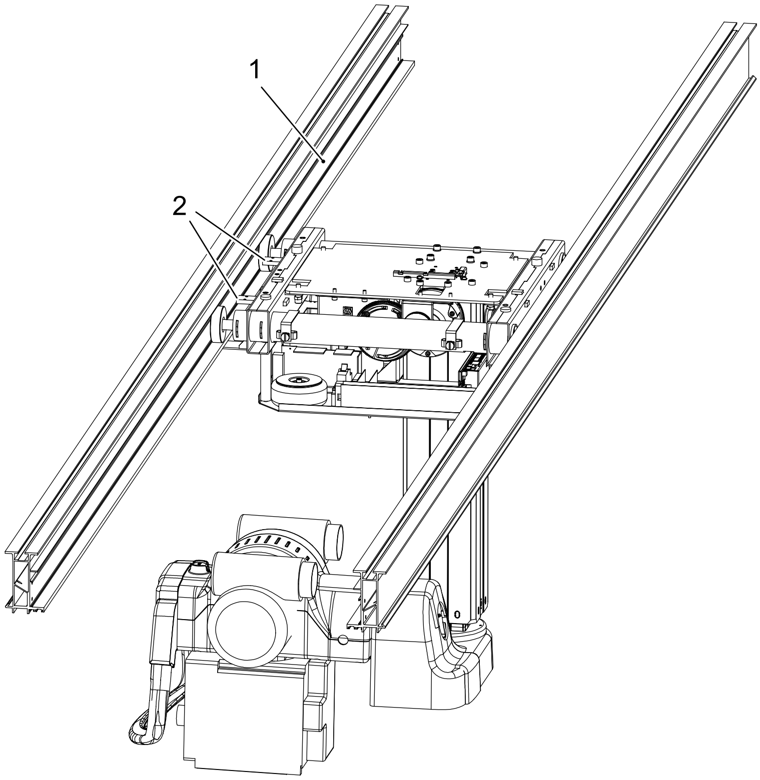


Fig. 4-9 Brake steel bars

1. *Steel bar for the brakes*
2. *Bracket for brake X.*

Lift up the traverse rails X and check that the wheel on the flat bar, see **Fig. 4-6**, ends up into the track of the ceiling rail Y.

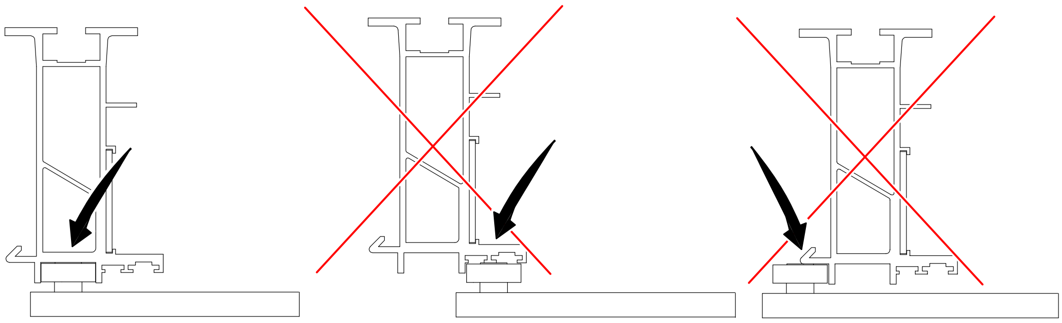


Fig. 4-10 Mounting traverse rail X

When the traverse rail X is in place, push out the wheels on the distance plates into the tracks on the ceiling rails Y, see picture A and B in **Fig. 4-12**.

The wheels must not be outside the tracks or too close to the ceiling rail Y, see figure below.

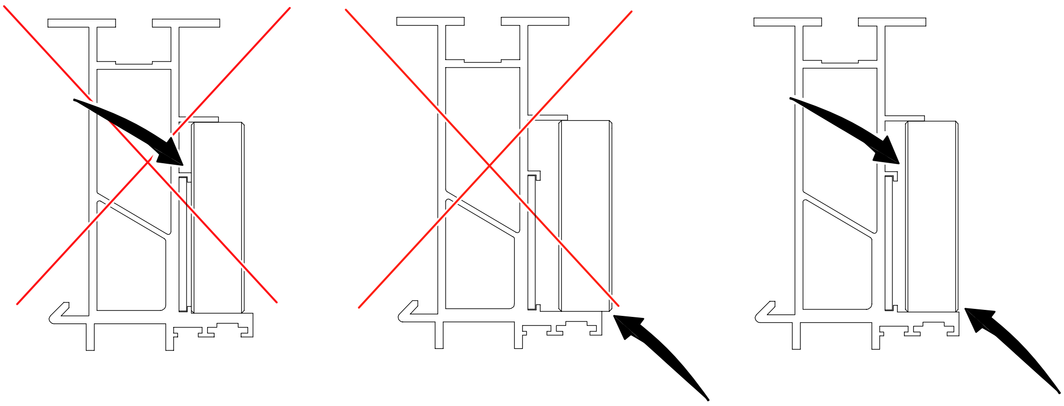


Fig. 4-11 Mounting of wheels

Install the set screws to lock the wheels when they are in position, also install the clamp ring into the shaft groove.

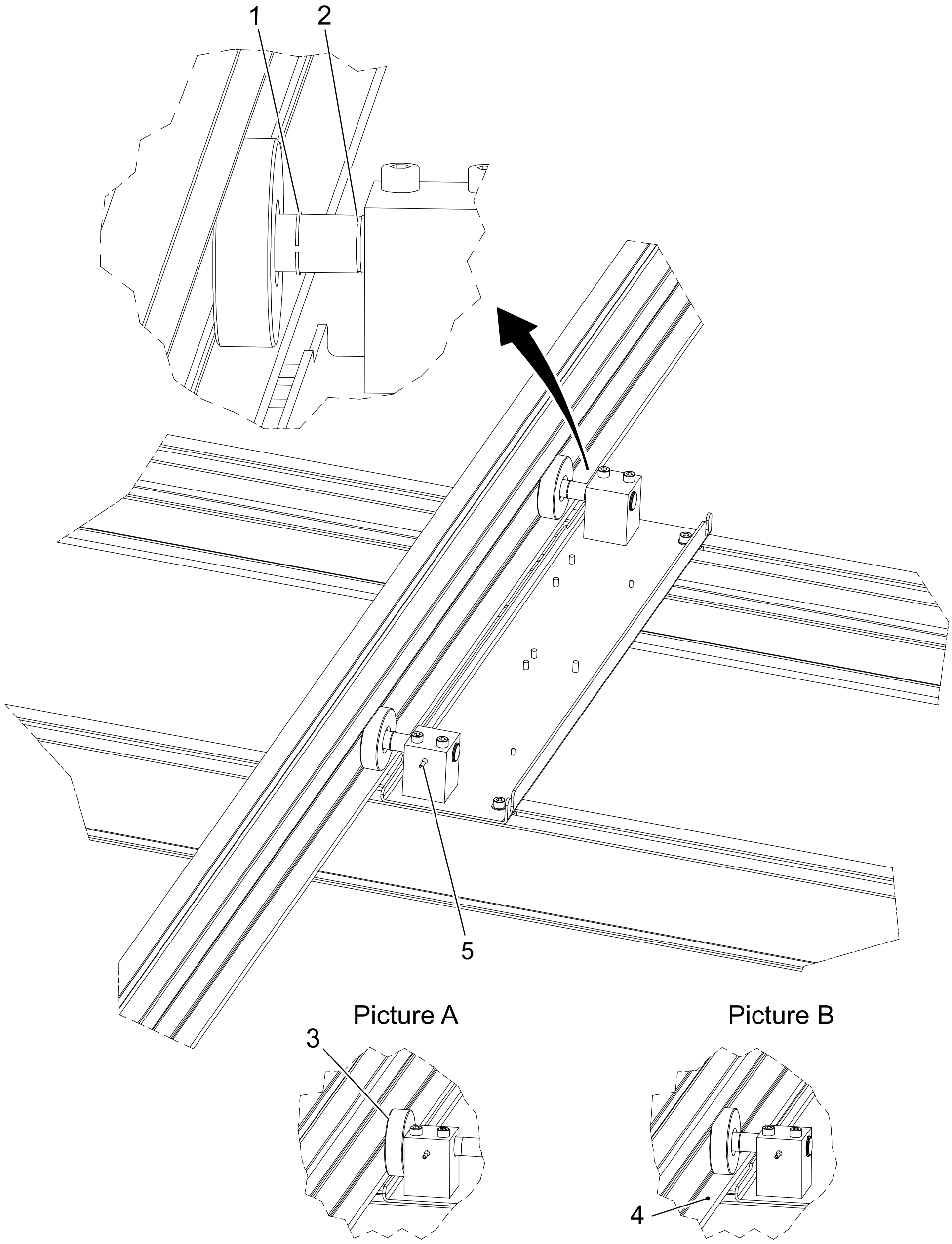


Fig. 4-12 Locking the wheels

1. *Clamp ring*
2. *Shaft groove*
3. *Wheel*
4. *Track*
5. *Set screw*

Run the transverse rails X all the way in Y direction. Make sure it runs smoothly.

4.6.4 Ceiling Wagon

Note!

Check the room layout for orientation of the ceiling wagon.

The ceiling wagon can either be lifted with the four enclosed rings (1), this shall be installed on top of the wagon, or lifted on the pallet with an industrial truck.

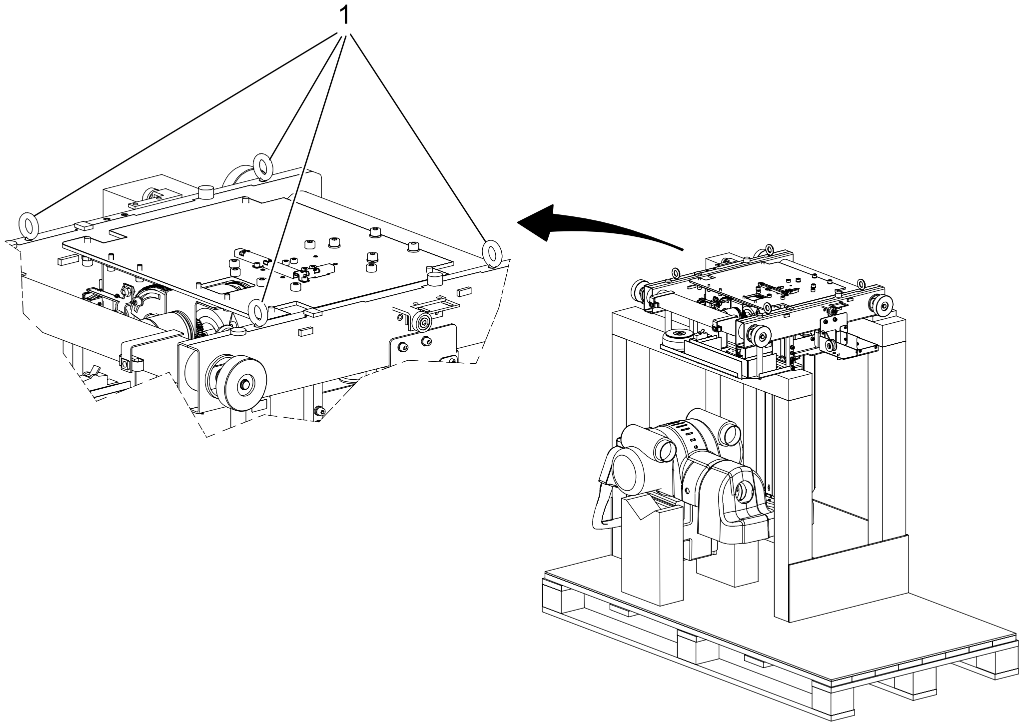


Fig. 4-13 Lifting ceiling wagon

Lift up the ceiling wagon and check that the side position bearings ends up into the track of the traverse rails X, see figure below and **Fig. 4-15**.

Check that the steel bar for the brakes is placed on the correct side of the ceiling wagon.

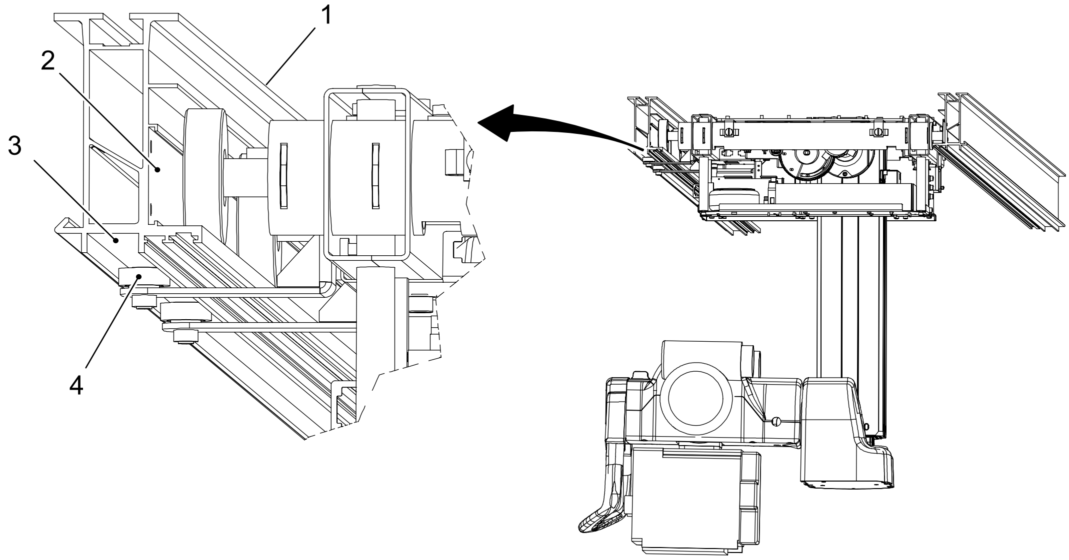


Fig. 4-14 Ceiling wagon

1. *Traverse rail X*
2. *Steel bar for the brakes*
3. *Track*
4. *Side position bearings*

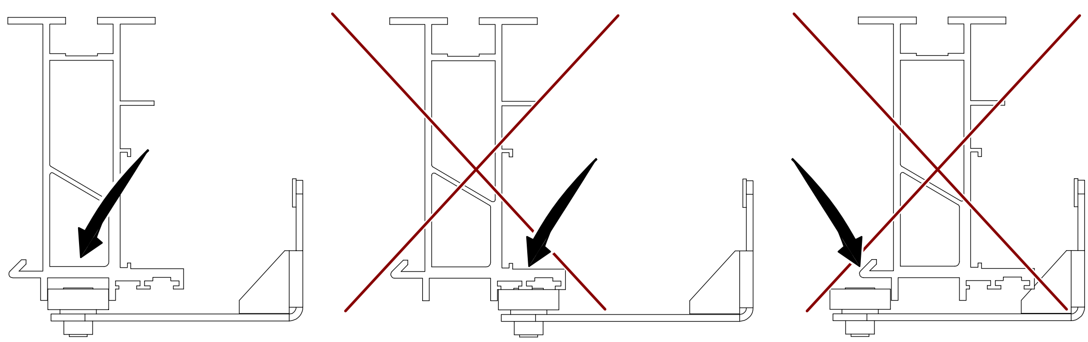


Fig. 4-15 Wheel position

Push out the wheels into the tracks on the traverse rails X.

The wheels must not be outside the tracks or too close to the traverse rails X, see **Fig. 4-11**.

When the wheels are in position, install the clamp rings into the shaft groove, see figure below.

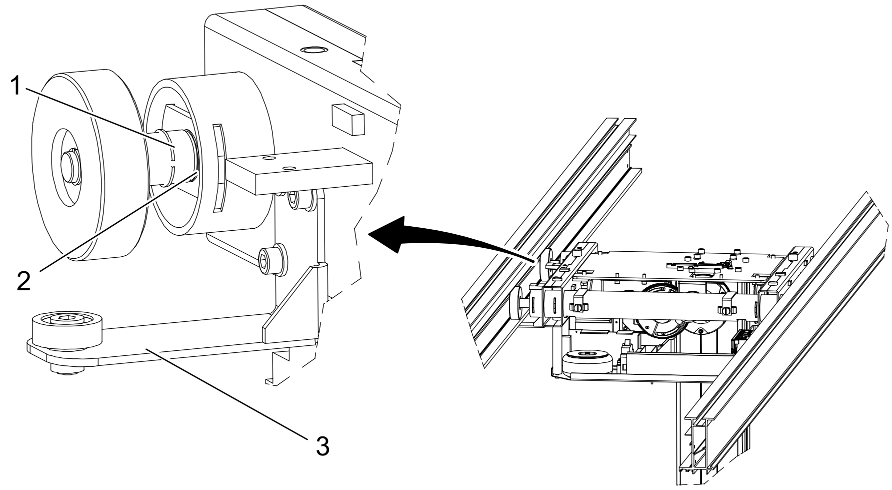


Fig. 4-16

1. *Clamp ring*
2. *Shaft groove*
3. *Side position bearings*

4.6.5 Safety Clamp Ring

Move the OTC manually in X direction. Make sure it runs smoothly and sounds OK.

When the position is decided, push the safety clamp ring (1) towards the clamp ring (2) as far as possible.

Note!

At delivery, the safety clamp ring might be positioned in direct contact of the wheel.

Push the safety clamp ring towards the clamp ring.

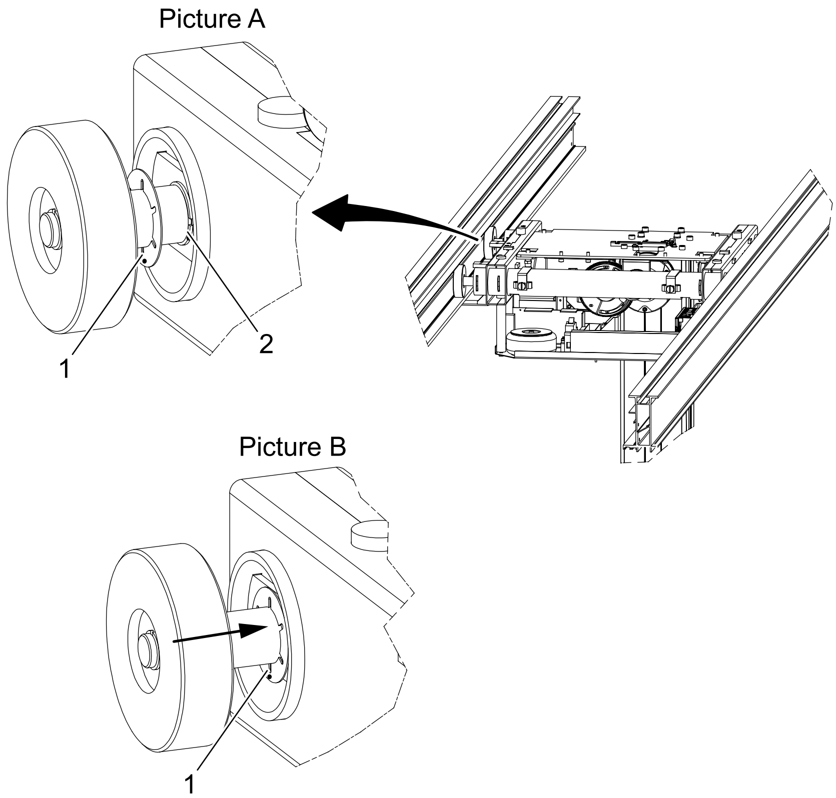


Fig. 4-17 Safety clamp ring

1. *Safety clamp ring*
2. *Clamp ring*

4.6.6 X-Brakes

Note!

When the brakes are installed you will not be able to move the OTC until power-up.

Install the X brakes on the bracket on the ceiling wagon, see picture 1. One on each bracket.

Install the X brakes against the steel bar for the brakes on the traverse rail X.

Connect both the X brakes according to picture 2.

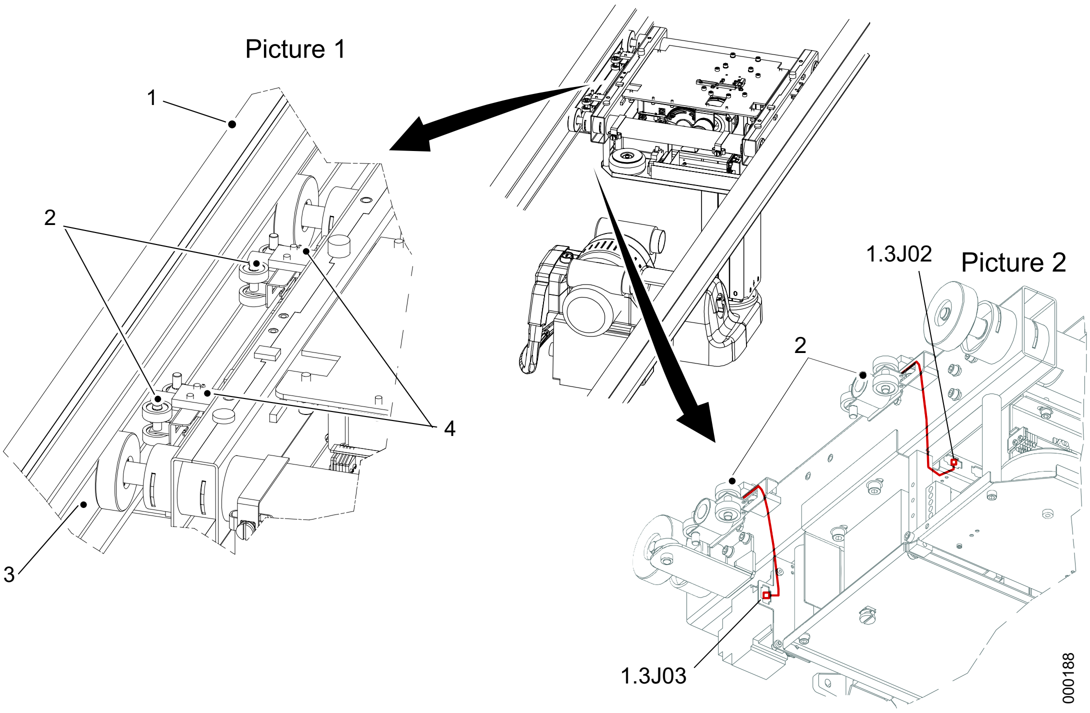


Fig. 4-18 X-brakes

1. *Traverse rail X*
2. *Brake X*
3. *Steel bar for the brakes*
4. *Bracket for brake X*

4.6.7 Cable Channel

Depending on the orientation of the ceiling wagon in the room, the cable channel can be installed on the left or the right side of the ceiling wagon.

Figure below shows how right respective left hose frame of the cable channel looks like.

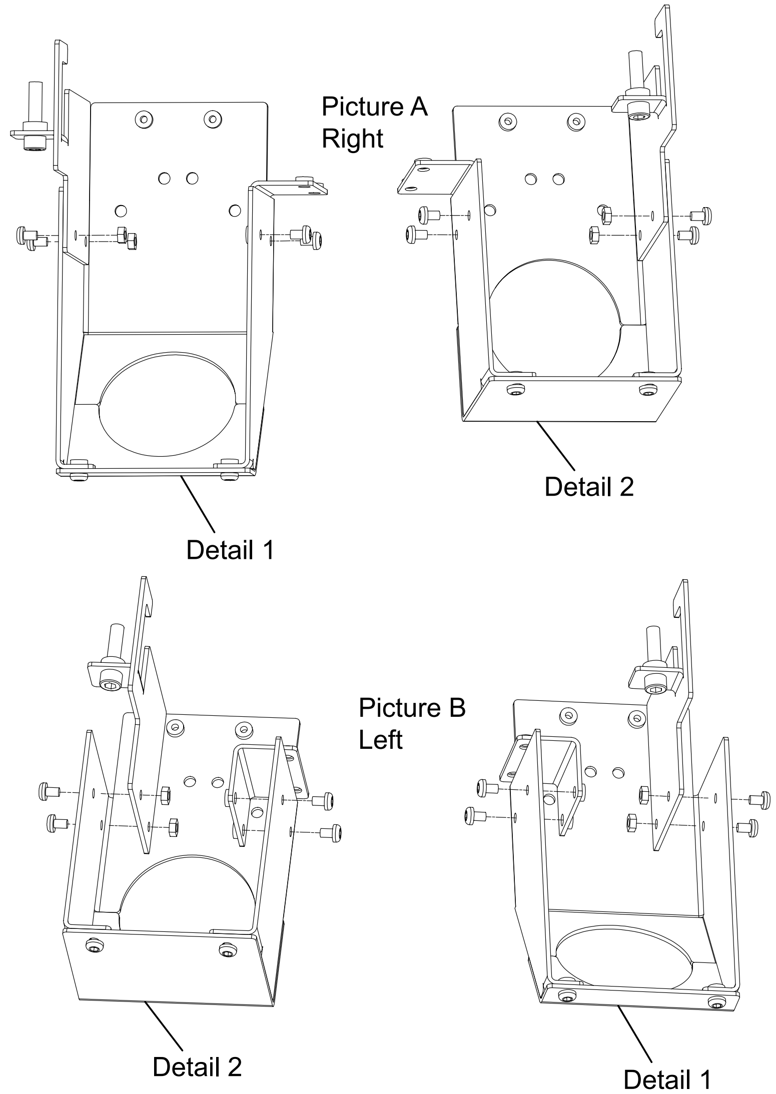


Fig. 4-19 Cable channel hose frames

To change the cable channel from right to left side, loosen the four screws according to picture C in **Fig. 4-20**.

Loosen the screws according to picture A in **Fig. 4-19** and switch place on the hose frames (detail 1 and 2).

Tighten the screws according to picture B in **Fig. 4-19** and D in **Fig. 4-20**. The cable channel can now be installed on the left side of the ceiling wagon.

Insert the cables inside the cable channel.

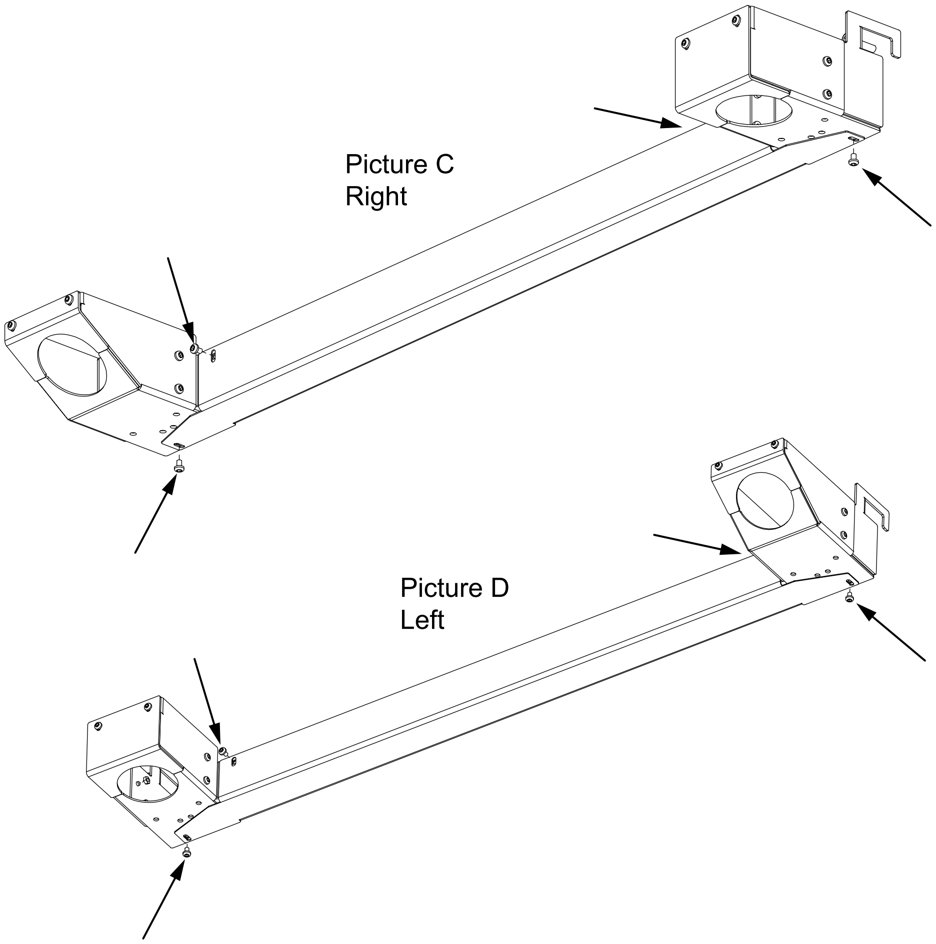


Fig. 4-20 Cable channels

Install the cable channel and tighten the screws (1) to lock the cable channel.

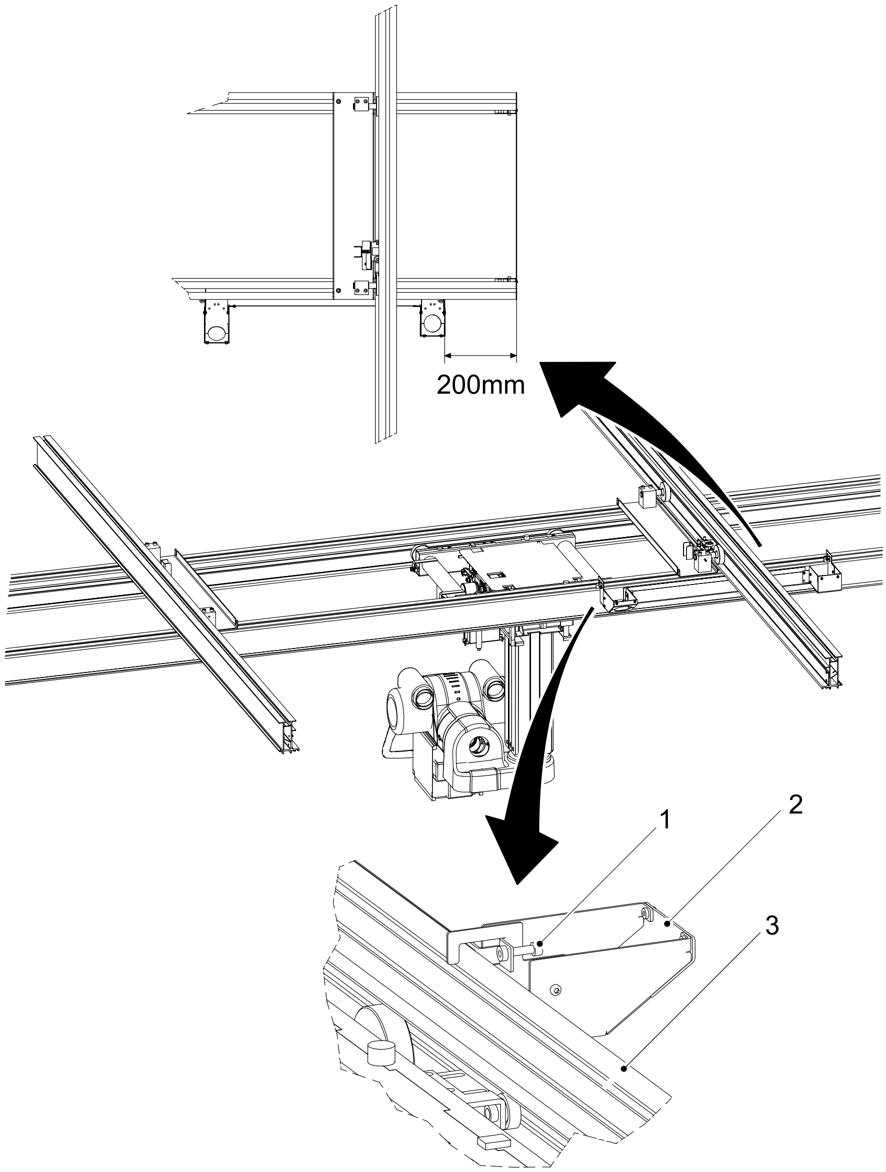


Fig. 4-21 Installing cable channel

1. *Screw*
2. *Cable channel*
3. *Traverse rail X*

4.6.8 Wall Attachment

Move the traverse rail X to its end position so the cable channel, installed on the traverse rail X, shall point toward the middle of the ceiling rail Y. If the OTC is not moved to its end position the hose may not be long enough when the OTC is positioning after installation.

Measure the distance A and install the wall attachment on half this distance (distance B) and at the same height as the ceiling rails Y. Use screws (M8x16), for locking the cable holder into the traverse. Shorten the hose if necessary after installing the wall attachment.

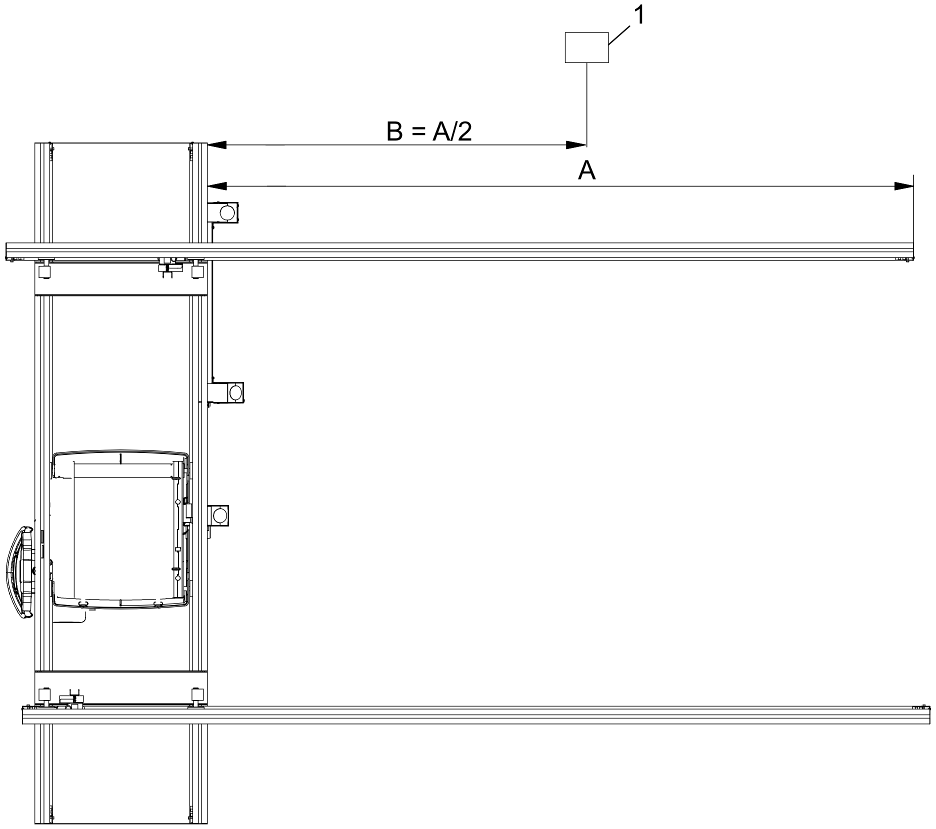


Fig. 4-22 Installing wall attachment

1. *Wall attachment*

4.6.9 Y-Brake

Note!

When the brakes are installed you will not be able to move the OTC until power-up.

Install the Y-brakes on the distance plate, one on each distance plate.

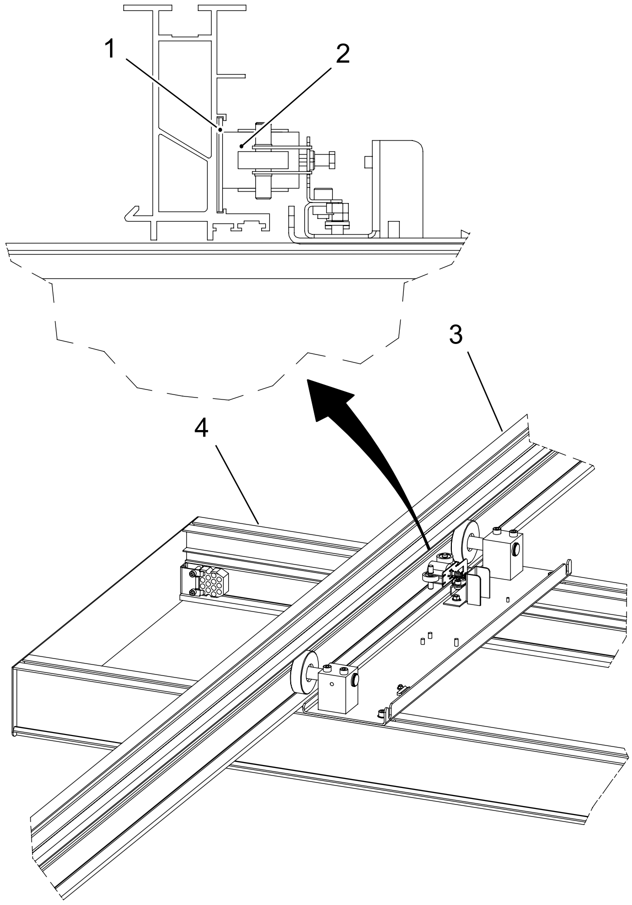


Fig. 4-23 Installing the Y brakes

1. *Steel bar for the brakes*
2. *Y Brakes*
3. *Ceiling rail Y*
4. *Traverse rail X*

4.6.10 Connect Brake Y

Connect the cables to the brakes Y, see . Bundle remaining cable length and place it on top of the distance plates.

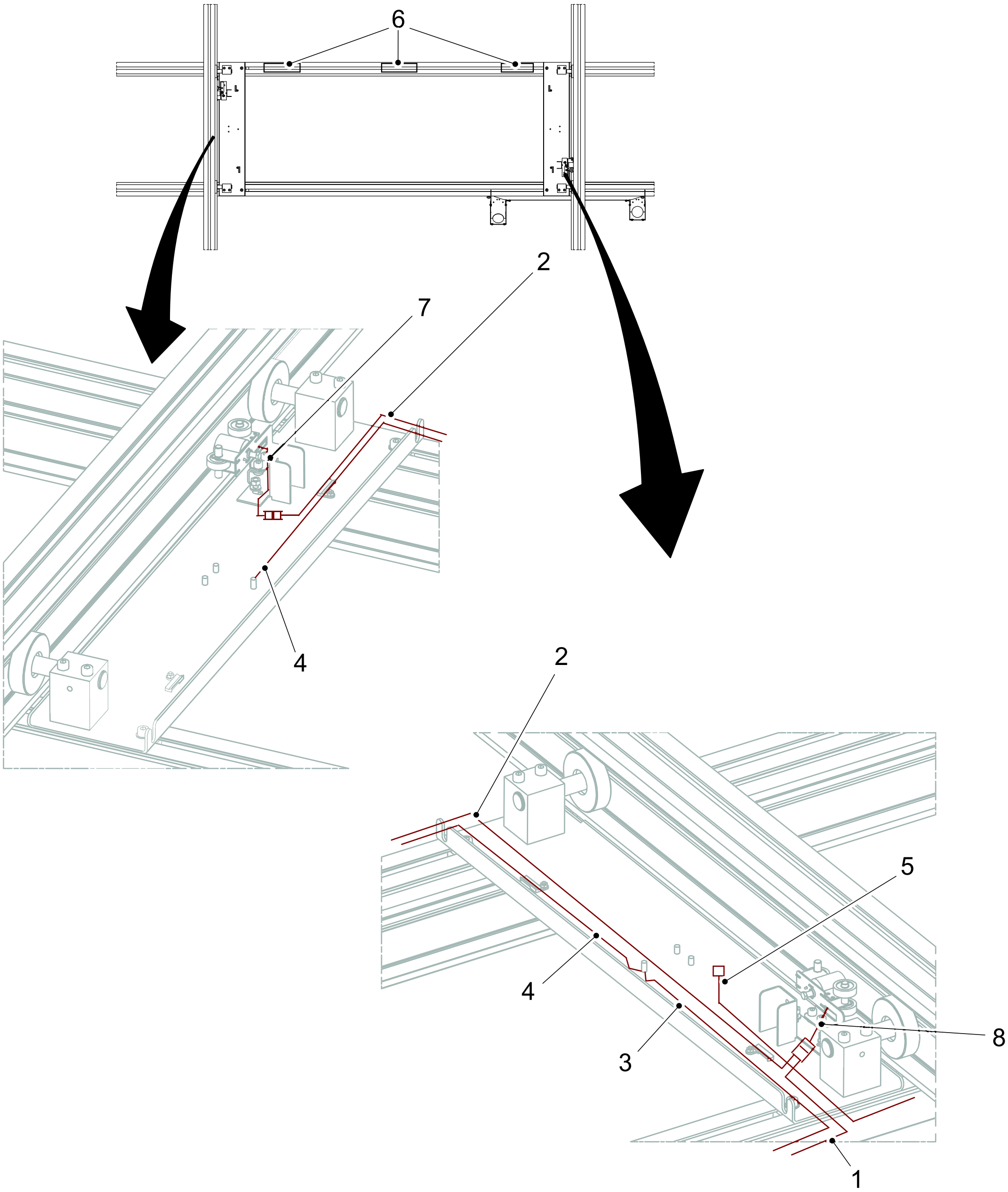


Fig. 4-24 Connecting cables to Y-brakes

1. *1,4BRA01*
2. *1,4BRA02*
3. *1,4PE01*
4. *1,4PE02*
5. *1,4SIG01 (option fail safe Y)*
6. *Tape*
7. *1,4 J03*
8. *1,4 J02*

4.6.11 Automatic Collimator (option), Transport Safety Bolts

The automatic collimator is delivered with transport safety bolts. Remove these before power on the system/collimator.

WARNING!

Remove all three transport safety bolts, before powering up the system.

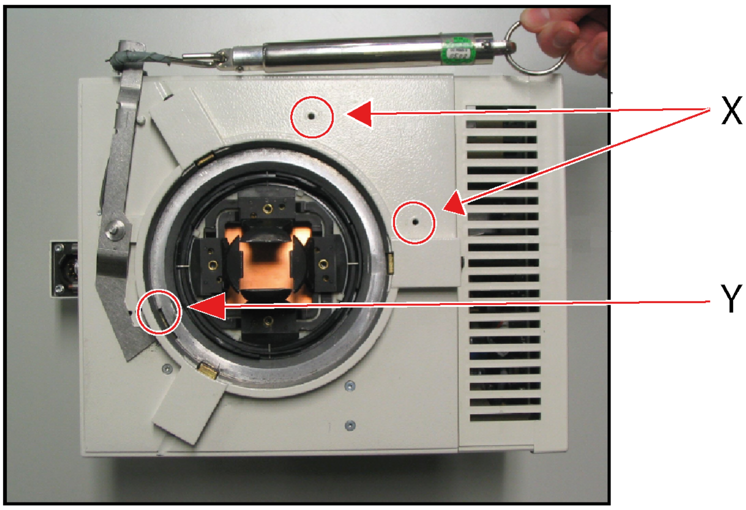


Fig. 4-25 Collimator safety bolts

4.6.12 Measure Isolation Between Hospital Protective Earth and OTC

Measure the isolation between the hospital protective earth and the OTC, before connecting any wiring between the OTC and the system cabinet.

1. Measure the resistance between the hospital protective earth and the OTC protective earth 1.3PE01.

   Use a visual or audible device (Ohmmeter, buzzer, etc.) to indicate protective earth continuity.
2. The resistance value must be ∞ Ω.

   If any resistance is measured, there is a connection between the OTC and the hospital protective earth, most probably between the Y rails and the hospital protective earth.

   The connection to the hospital protective earth must be removed before continuing.

   – Check the correct mounting of all insulation plates and insulation cases, see **Fig. 4-4 Mounting ceiling rail Y, Page 116**.

   – Remove the bolts, one at a time and measure until the connection is found.

   – Make sure no external equipment, e.g. computer are connected.

4.7 Mechanical Installation of Cabinet

Place the cabinet in a corner of the room.

4.7.1 Cover for Cable Outlet

The corner marked (1) in figure below must be placed in one corner of the room. Depending on the installation of the cables from the OTC, table and wallstand, one of the cable outlets (2) is used.

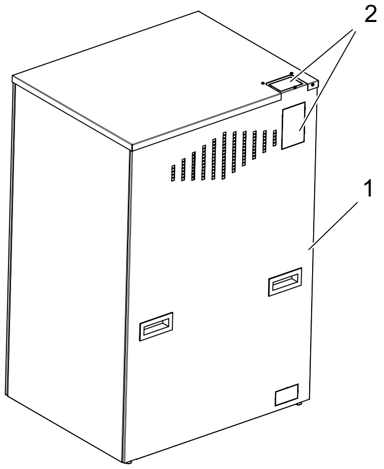


Fig. 4-26 Cable outlets

- Remove one of the covers to the cable outlets (2).
- The borders of the outlet have to be covered with the enclosed edging strip.

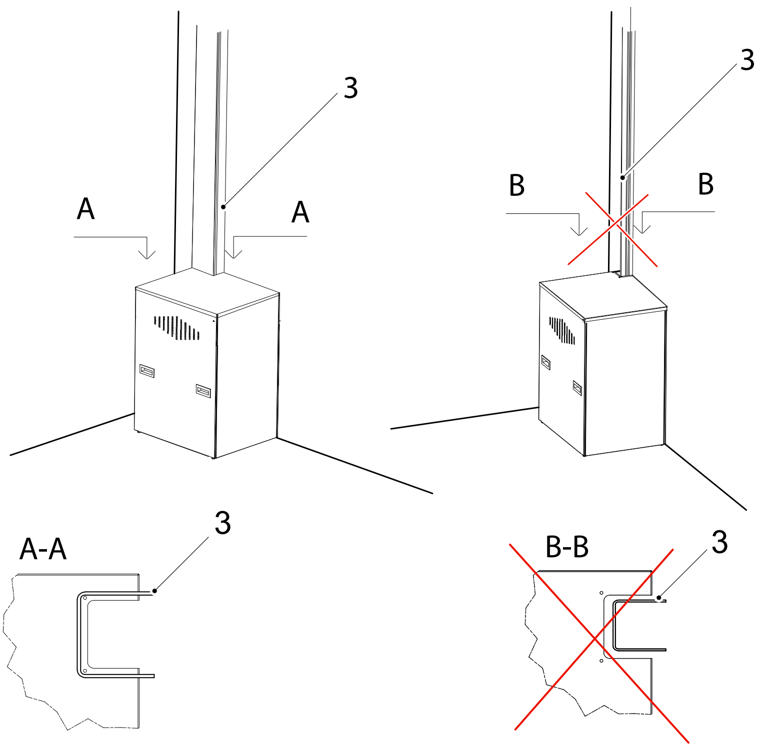


Fig. 4-27 Positioning cabinet

- The cables must be covered with a cable channel. The cable channel has to cover the cable outlet completely see section A-A up of and figure below. The cable channel should only be possible to open with a tool.
- The cables have to be secured with a cable clamp or a suitable strain relief.

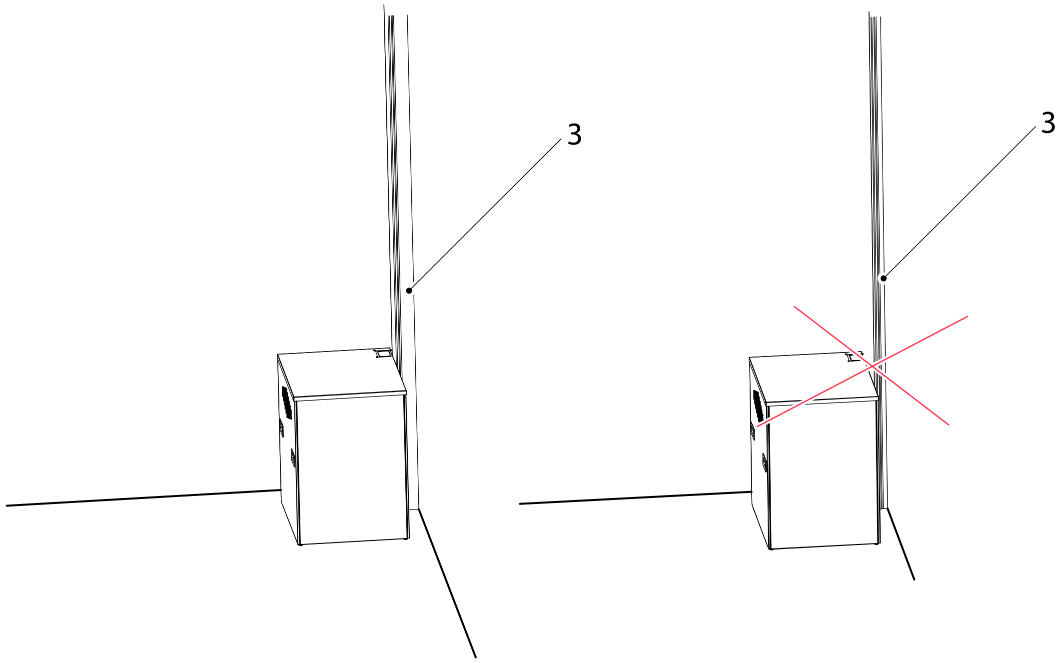


Fig. 4-28 Covered cables

4.7.2 Measure Isolation Between Hospital Protective Earth and System Cabinet

1. Measure the resistance between the hospital protective earth and the system cabinet.

   Use a visual or audible device (Ohmmeter, buzzer, etc.) to indicate protective earth continuity.
2. The resistance value must be $\infty\ \Omega$.

   If any resistance is measured, there is a connection between the system cabinet and the hospital protective earth, e.g. in one of the fixation bolts (if bolted to the floor or wall) or through a metal cable channel.

   The connection to the hospital protective earth must be removed before continuing.

4.7.3 Remove Covers, Cabinet

Remove the covers:

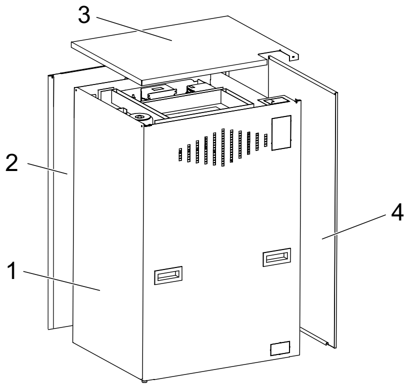


Fig. 4-29 Remove cabinet covers

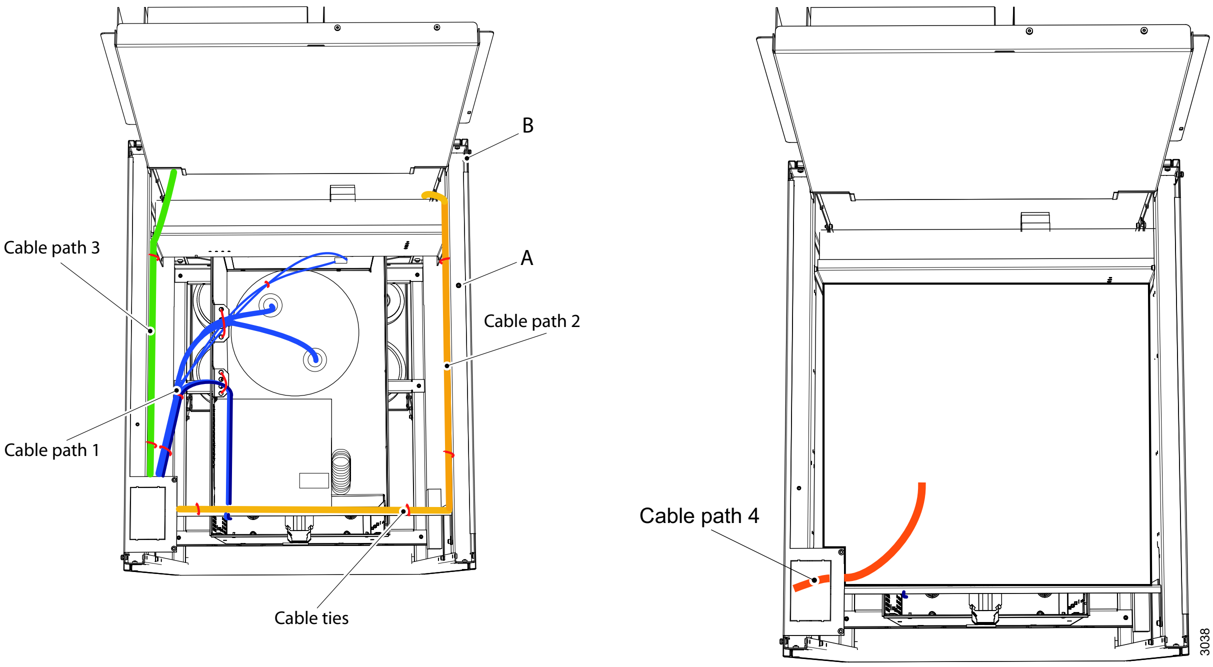
4.8 Cable Paths, System Cabinet

1. Remove screw A.
2. Lift up the electrical plate 4.4 and secure it with screw A in position B.

CAUTION!

Tie the cables carefully to the frame. Otherwise there is a cable squeezing hazard.

Table 4-3 Cable paths



- Cable path 1 — to the generator.
- Cable path 2 — to the electrical plate 4.2.
- Cable path 3 — to the electrical plate 4.4.
- Cable path 4 — to the electrical plate 4.5.

4.9 Electrical Installation of OTC

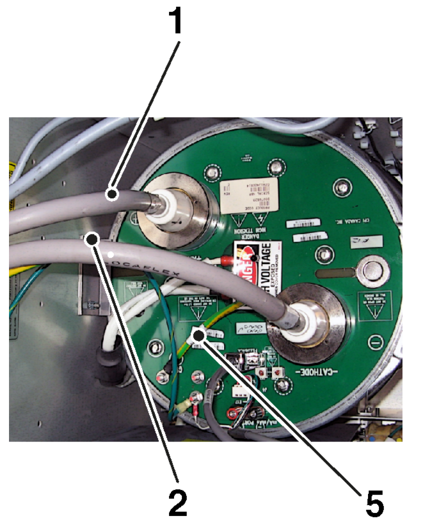
Note!

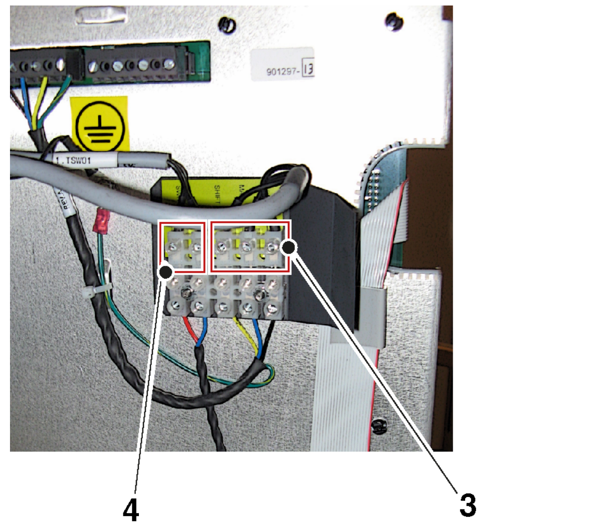
The cables must be installed covered.

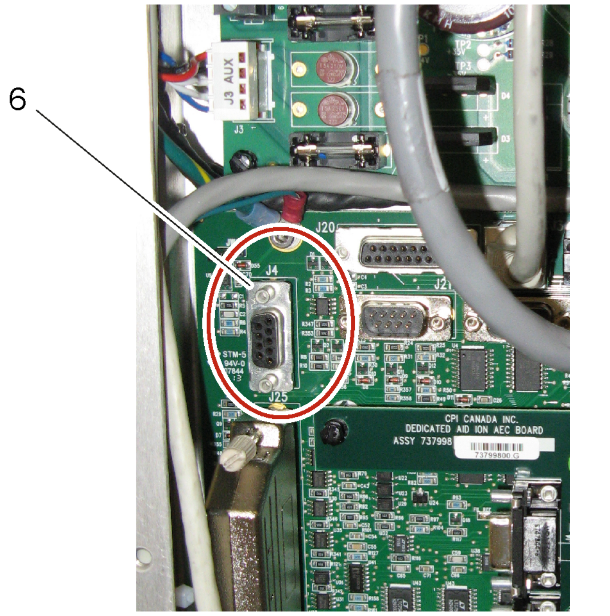
They shall not be placed on the floor.

Lubricate the HSP connectors generously with silicone oil. Use the silicone gaskets.

Wiring to generator, is made according to path 1, **Table 4-3**.







1. 1.THSP+
2. 1.THSP-
3. 1.TSTA01 — Rotation cable
   Cable 1 — Shift
   Cable 2 — Main
   Cable 3 — Common
   Shield — Ground
4. 1.TSW01
   Cable 1 — Thermal switch
   Cable 2— Thermal switch
5. 1.TPE01 — PE Tube
6. 1.CDAP01 — GEN — J4

Wiring to electrical plate 4.2 is made in accordance with cable path 2, **Table 4-3**.

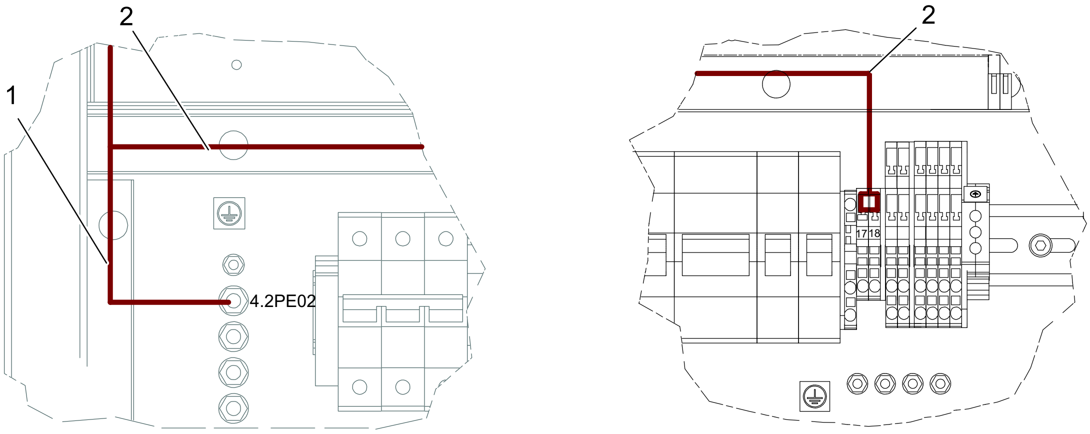


Fig. 4-30 Electrical plate 4.2

1. *1.3PE01 – 4.2PE02*
2. *1.1POW01 – 4.2J01 17–18*

Wiring to electrical plate 4.4 is made in accordance with cable path 3, see **Table 4-3**.

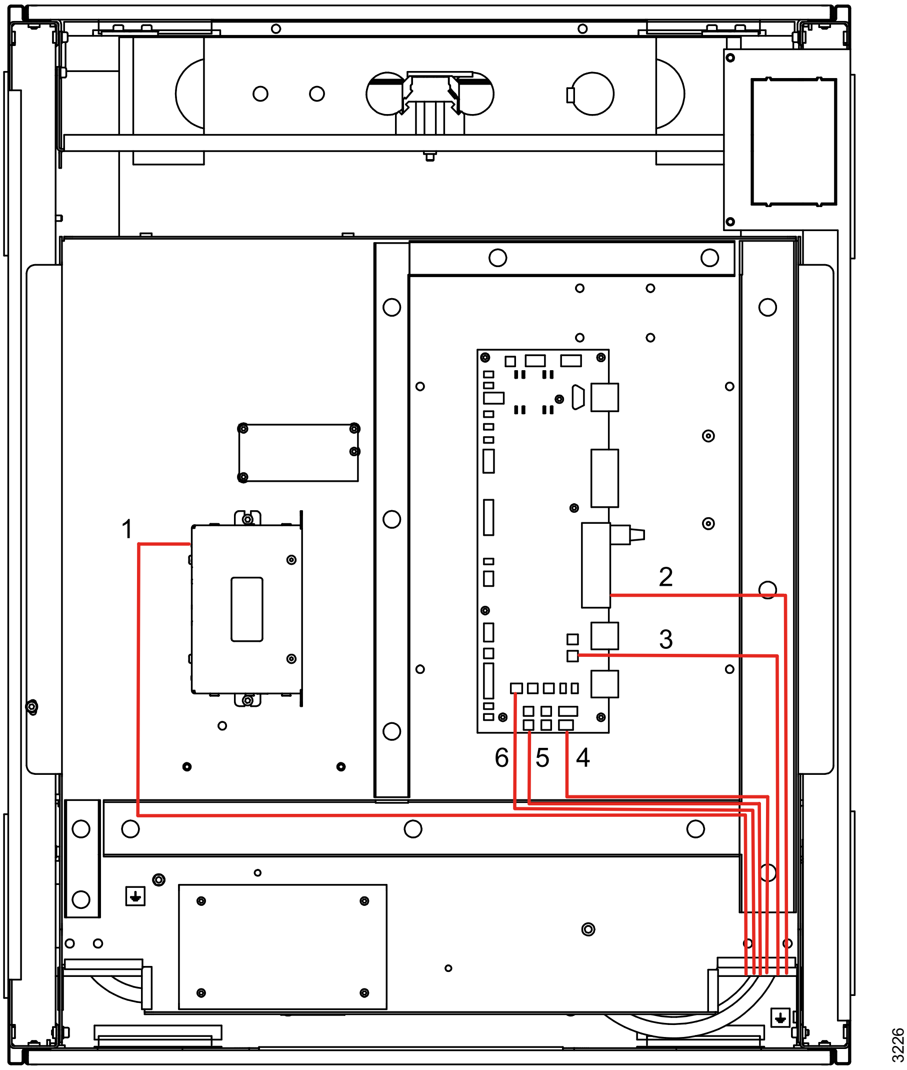


Fig. 4-31 Electrical plate 4.4

1. 1.6DSP01	*4.4CB800_01–J0*
2. 1.1CAN02	*4.4FIB01 J28–P1*
3. 1.1SIG01	*4.4FIB01–J37*
4. 1.1FS01	*4.4FIB01–J34*
5. 1.4SIG01	*4.4FIB01–J36*
6. 1.1EM01	*4.4FIB01–J18*

4.10 Mechanical Installation of Wallstand

WARNING!

If any item is removed from the wallstand, e.g. the detector holder, the wallstand will become highly unbalanced.

When the brake is released, part of the wallstand will move upward and can cause injury.

The operation should be performed by trained personnel.

4.10.1 Orientation of Wallstand

Before unloading and placing the wallstand on the floor, check for enough free space around the device to allow free movement. See the Planning Guide for further information of required space around the wallstand and the position in the room.

4.10.2 Unloading

WARNING!

When the wallstand is not bolted to the floor, the wallstand is unstable, front-heavy and may fall down.

Bolt the wallstand to the floor when it is upright. Install the counterweights to balance the wallstand.

Note!

Packages has "Up" and "Down" marks on the top and bottom sides of the wallstand.

Follow the instruction for unloading the wallstand.

1. Remove the package band from the package.
2. Remove all the mounting screws on the top and bottom of the crate sides.
3. Remove the top crate, then the crate sides as a set.
4. Remove the screws from two cross-ties, securing the wallstand.

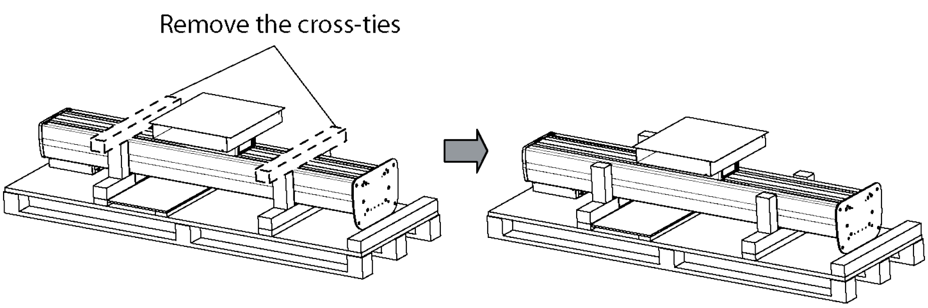


Fig. 4-32 Removing cross-ties

CAUTION!

Do not hold the wallstand by the base when lifting it up.

Note!

*Do **not** lift the wallstand from the bottom.*

5. With help from at least two persons, lift the wallstand, as indicated in the figure below. Lift the wallstand off the pallet, see **Fig. 4-33**.

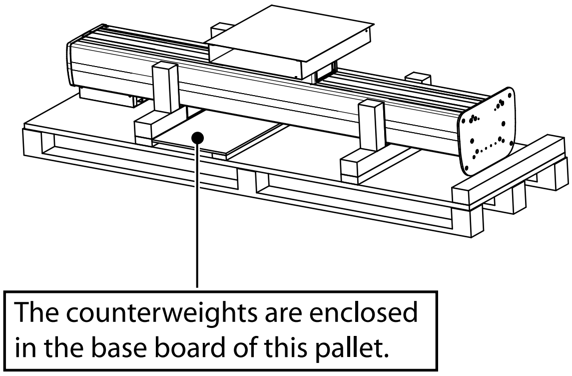


Fig. 4-33 Lifting wallstand off the pallet

4.10.3 Attachment of Wallstand

The wallstand must be installed on a solid base with sufficient load capacity. The floor must be able to withstand the pull forces supplied on the drive-in anchor.

Drill size:	12 mm
Anchor, total length:	45 mm

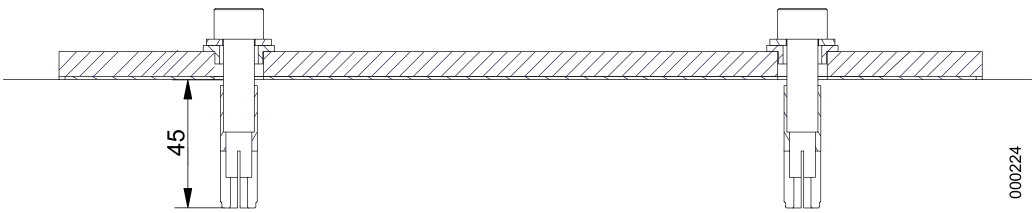


Fig. 4-34

1. Position the wallstand.
2. Mount the insulation washer (5) between the plate and the floor.
3. Temporarily attach the stand to the floor, with one bolt. Making it possible to readjust the parallelism to the OTC.
4. Drill just one hole (C).
   The three remaining holes shall be drilled after the alignment.

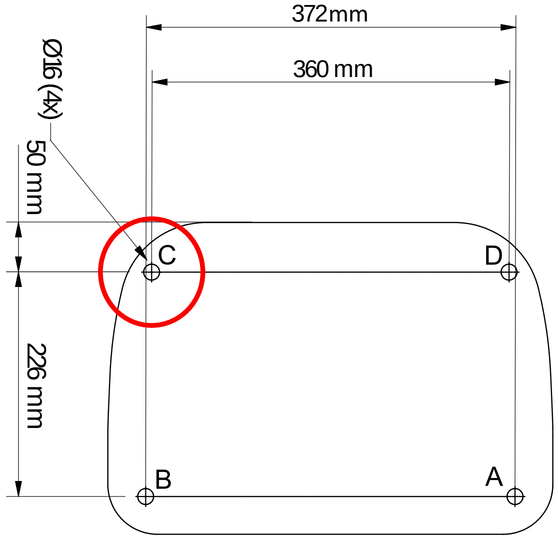


Fig. 4-35 Marking template, wallstand (insulation plate)

1. Drill a hole.
2. Clean the drilled hole.
3. Knock in drive-in anchor until flush.
4. Insert and knock spreading tool to expand drive-in anchor.
5. Attach wallstand. Tightening torque 25 Nm

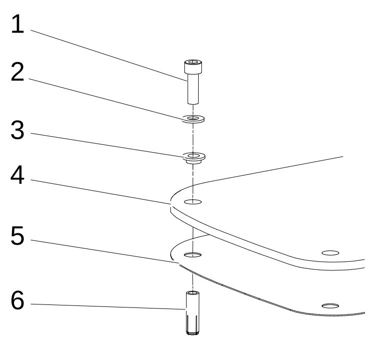


Fig. 4-36 Temporarily attachment

1. *Bolt*
2. *Insulation washer*
3. *Insulation case*
4. *Bottom plate*
5. *Insulation plate*
6. *Drive-in anchor*

4.10.4 Install Fix Detector (Option)

1. Check the humidity indicator.
2. Remove the cover.

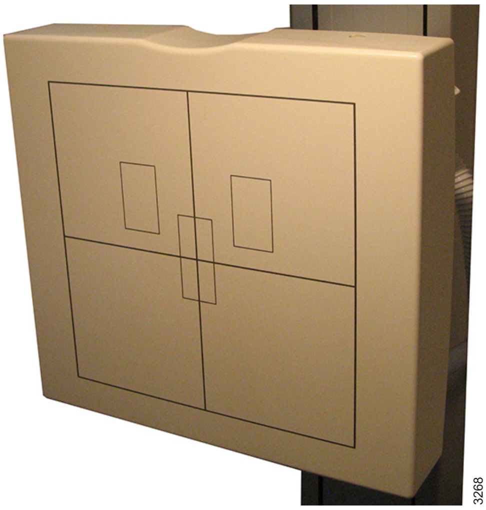


Fig. 4-37 Cover

3. Remove the AEC chamber.

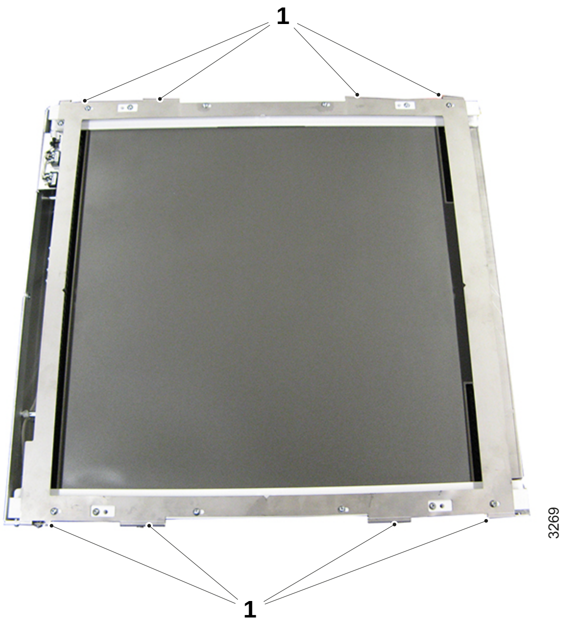


Fig. 4-38 AEC chamber

1. Screws, AEC chamber

4. Connect the cables to the detector.

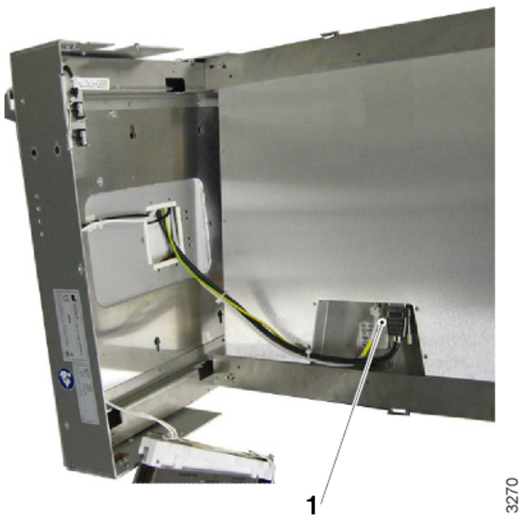


Fig. 4-39

   1. *Cables*

5. Put one side of the detector in the detector holder.
6. Pull the detector holder frame gently and lower the detector.

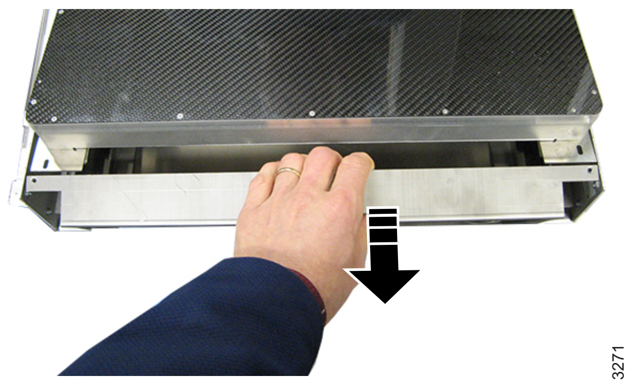


Fig. 4-40

7. Fasten the detector with screws and washers.

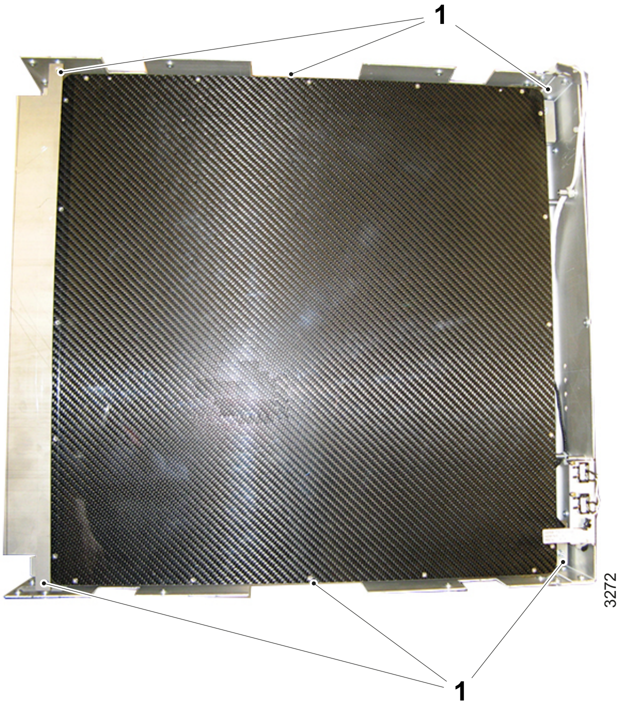


Fig. 4-41

1. Screws and washers

8. Install the AEC chamber.

Note!

Make sure the AEC chamber is installed without mechanical tension.

9. Install the cover.

4.10.5 Remove Back Cover

1. Remove the two screws (hex-head screws, 3 mm diameter) under the electrical box.

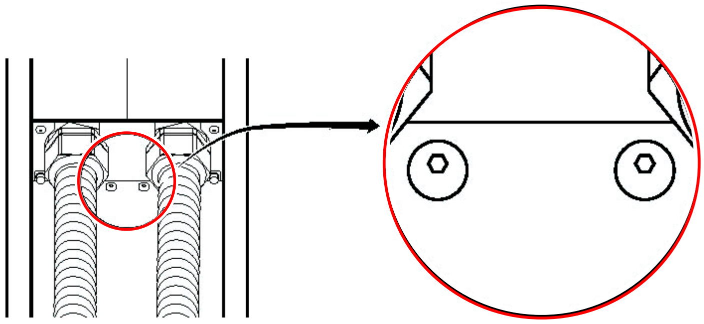


Fig. 4-42 Screws under electrical box

2. Remove the two screws (hex-head screws, 2.5 mm diameter) at the bottom of the back of the wallstand.

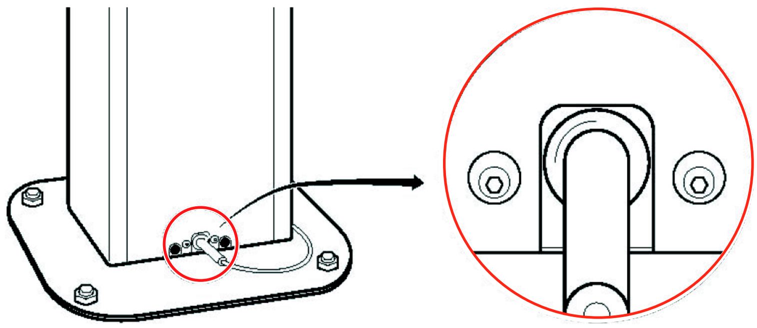


Fig. 4-43 Screws, back of wallstand

4.10.6 Install Counterweights

CAUTION!

Squeezing hazard when the back cover is removed, your hands etc. may be caught in the internal moving parts (e.g. counterweights).

Do not remove the safety bolts and pins for transportation, unless it is stipulated in this manual.

CAUTION!

Install the counterweights before installing the detector.

The counterweights (2.37 kg and 0.26 kg) are enclosed in the base board of the pallet.

The bottom plate (2.37 kg) is marked “Bottom plate” and is already installed.

1. When installing or removing the counterweights, loosen the screws in position A.
2. Release and remove the long screws (B) that fix the counterweights in their position.

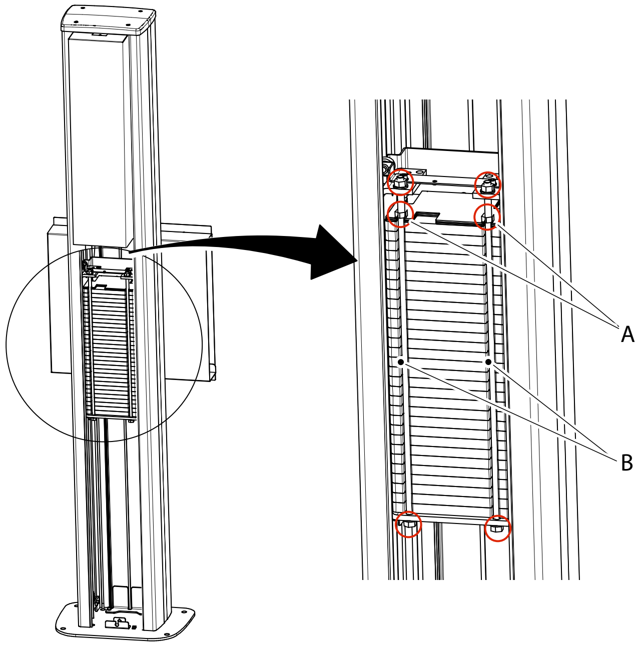


Fig. 4-44 Counterweight screws

3. Install the enclosed counterweights from the back of the wallstand.
4. Start to install the bottom plate.
5. Install the counterweights. Leave a space for removing the transport locking device.

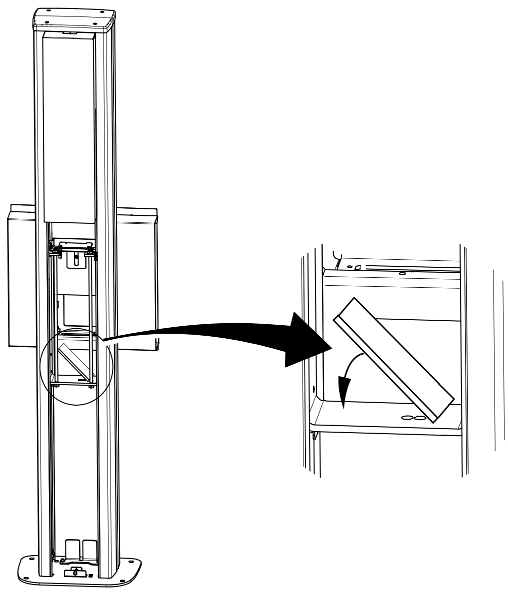


Fig. 4-45 Installing counterweights

CAUTION!

The detector holder may become unbalanced when removing the transport locking device.

6. Remove three screws to the transport locking device and remove locking device.

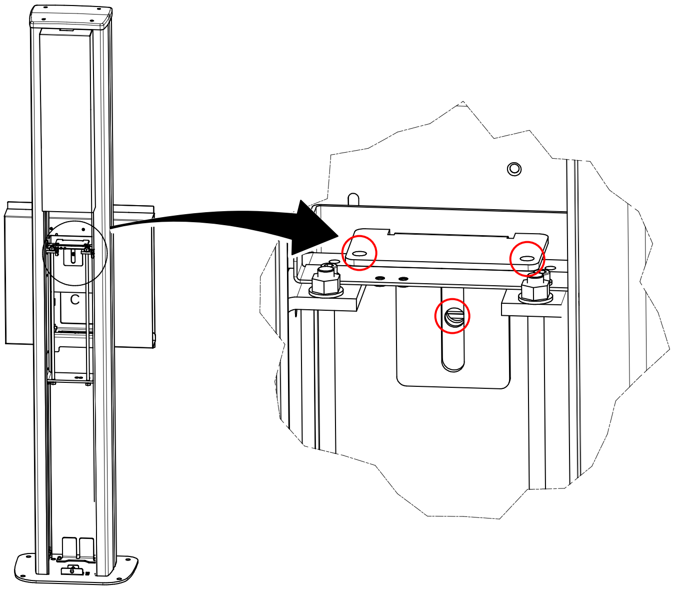


Fig. 4-46 Removing locking device

7. Install the remaining counterweights.
8. The counterweights must be fixed with two long screws (B) and six nuts. Three on each side to make sure that they are pulled together, see **Fig. 4-44**.

4.10.7 Install Foot Control

Connect the foot control on the lower back side of the wallstand position A.

The foot pedal should be positioned so that it cannot be activated accidentally.

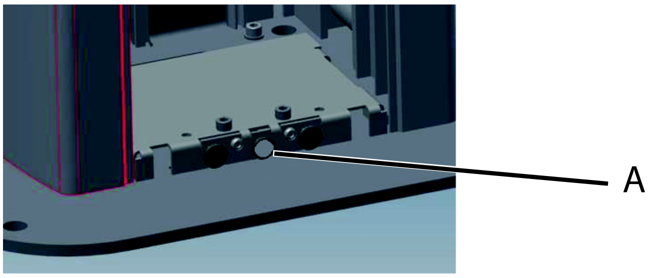


Fig. 4-47

1. Remove two screws and remove the mounting bracket.

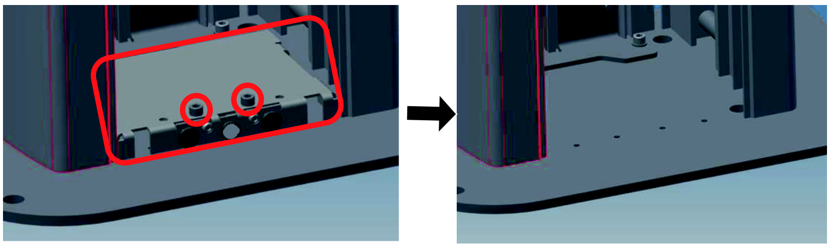


Fig. 4-48

2. Connect the foot control

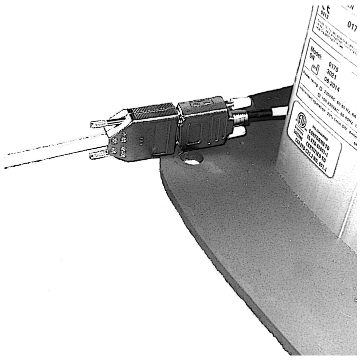


Fig. 4-49

3. Install the mounting bracket.

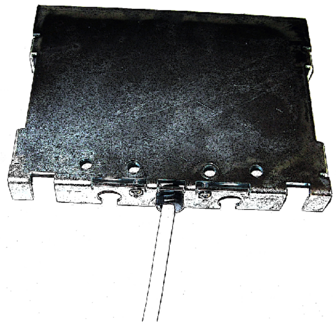


Fig. 4-50

4.10.8 Reassemble Back Cover, Wallstand

1. Reassemble the two screws (hex-head screws, 2.5 mm diameter) at the bottom of the back of this equipment.

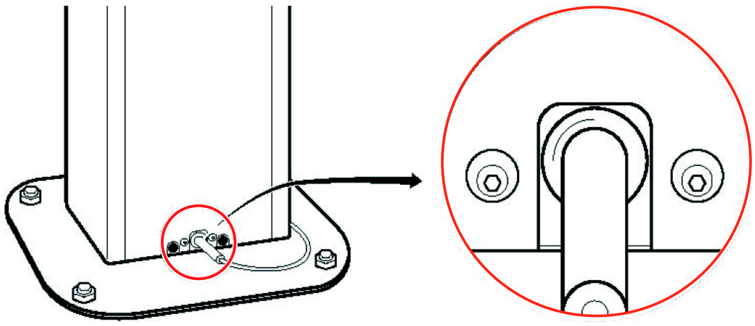


Fig. 4-51 Reassembling the two screws at the wallstand back

2. Reassemble the two screws (hex-head screws, 3 mm diameter) under the electrical box.

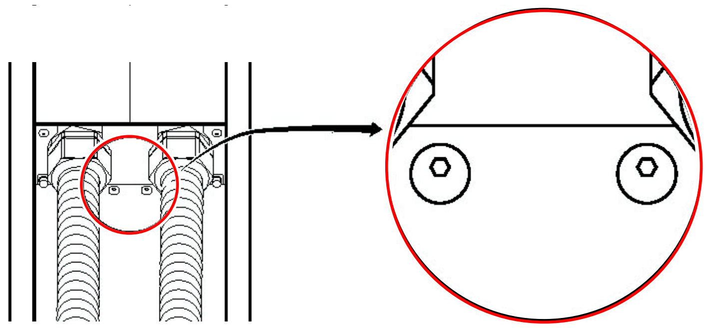


Fig. 4-52 Reassembling the two screws under the electrical box

4.10.9 Wall Attachment for Cable Hose

Install the wall attachment for the cable hose on the wall on a suitable place behind the wallstand.

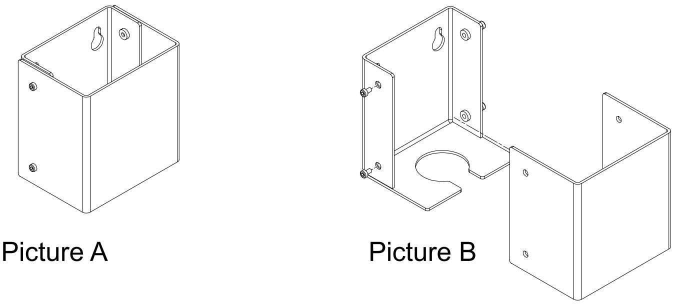


Fig. 4-53 Wall attachments

4.11 Electrical Installation of Wallstand

4.11.1 Connect Wallstand

Note!

The cables must be installed covered.

They shall not be placed on the floor.

Wiring to electrical plate 4.2 is made in accordance with path 2, see **Table 4-3**.

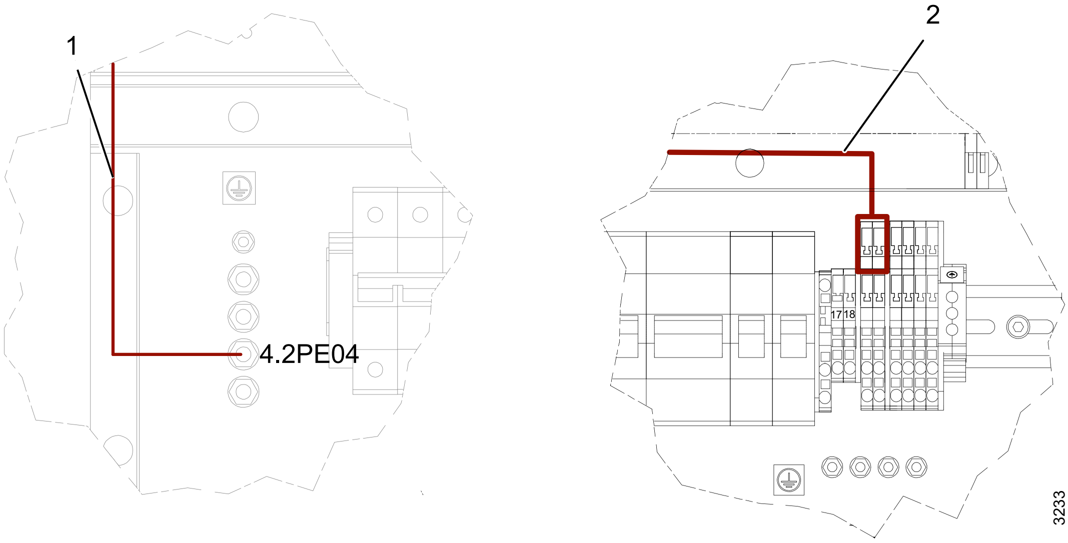


Fig. 4-54 Connecting the wallstand

1. *3.0PE01 – 4.2PE04*
2. *3.0POW01 – 4.2J01 19–20 (wallstand with motor Z)*

Wiring to electrical plate 4.4 is made in accordance with path 3, see **Table 4-3**.

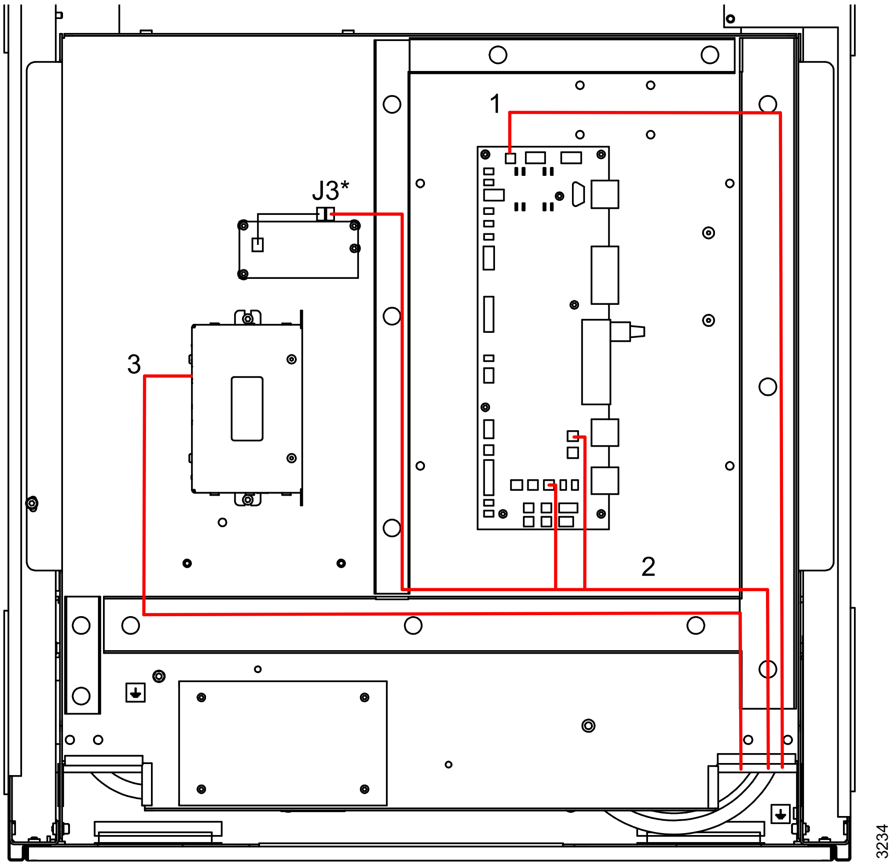


Fig. 4-55 Electrical plate 4.4

1. *3.0POW01 – 4.4FIB01–J4 (wallstand manual Z)*
2. *3.0SIG01 – 4.4FIB01–J20, J38 and J3**
3. *3.0CAN01 – 4.4CB800_01_J2*

* J3 only if stitching is available.

Wiring to the generator is made in accordance with path 3, see **Table 4-3**.

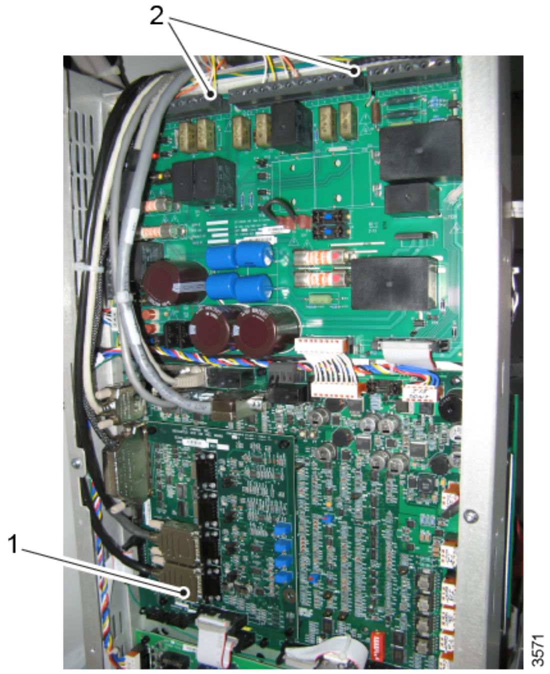
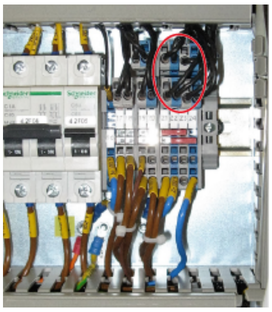
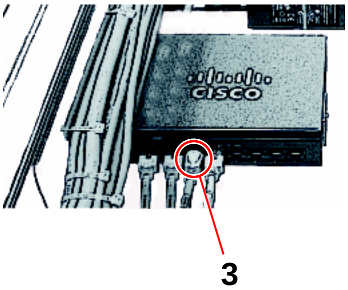


Fig. 4-56 Connecting wallstand AEC

1. *3.DAID01 – Gen AEC-J1*
2. *3.DI/F01 Gen AUX-PWD (option)*
   A1 J2–7
   A2 J2–8
   B1 J2–5
   B2 J2–6

Table 4-4 Wallstand detector installation

3.DPOW01	Wiring shall be done according to cable path 2, see **Table 4-3**.	
	4.2J01 21–22	
Wiring shall be done according to cable path 4, see **Table 4-3**.		
3.DETH01	4.5HUB01–3	

4.12 Mechanical Installation of Table

Note!

Do not bolt the table to the floor until the table is aligned with the OTC.

Note!

Check that there is enough free space around the table to make it possible to mount the table top.

4.12.1 Closed Table

4.12.1.1 Orientation of Closed Table

Before placing the table on the floor, check for enough free space around the table, to allow free movement.

See the Planning Guide for further information of required space around the table. Plan the positioning of the table in accordance with the room layout.

Clearance to Wall

Note!

According to IEC60601-1 clause 9.2.2.2, the clearance between the table top and the wall shall be minimum 500 mm.

There are squeezing hazards between the moving table top and the wall. The measurements in the figure are important, according to IEC60601-1 clause 9.2.2.2.

Consider maximum cable length. The mechanical stop can be moved closer to the center of the table top. The stroke of the table top will then be shorter.

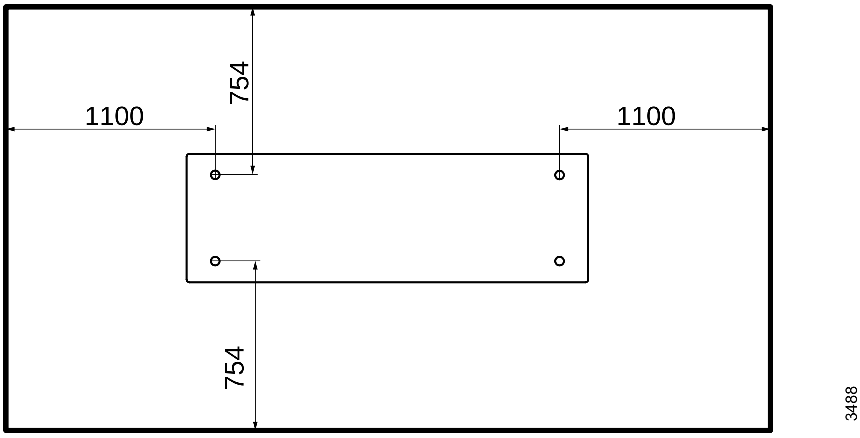


Fig. 4-57

Cable Duct in Floor

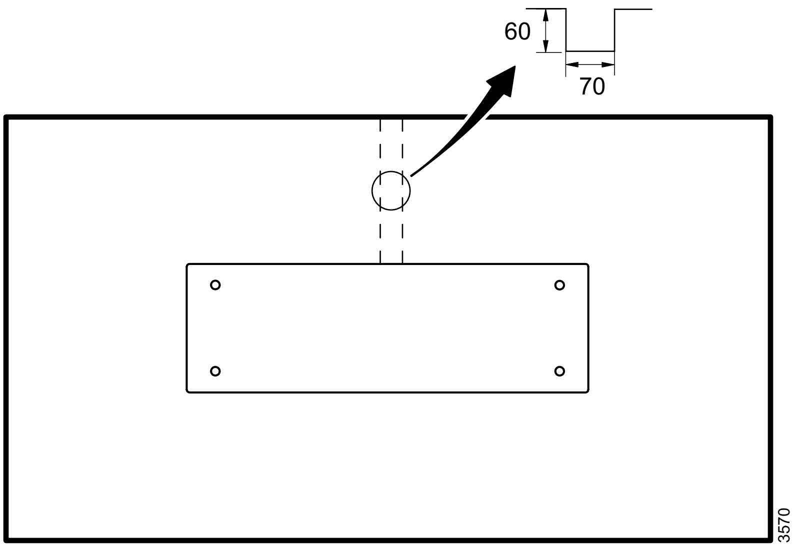


Fig. 4-58 Cable duct

4.12.1.2 Remove Covers

WARNING!

When removing the upper screws the cover will fall down.

Two persons are needed for this action.

WARNING!

All work without covers, shall be done with the mains supply turned off.

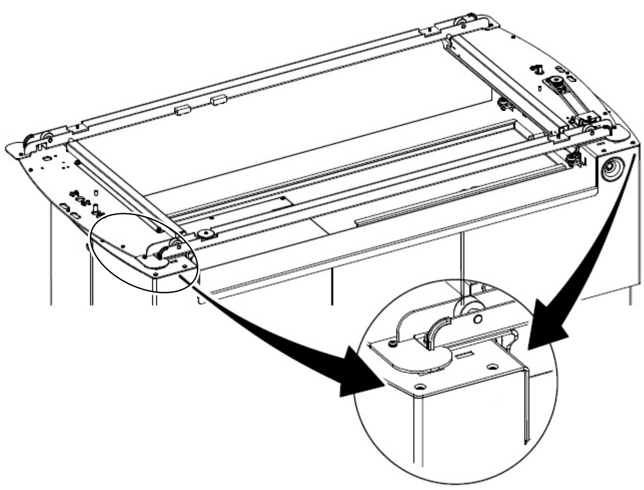
Note!

The emergency stop buttons are attached to the upper cover with the cables (2.3J03, 2.4J03) connected.

When removing the upper cover, disconnect the cables from the connectors, or place the removed upper cover next to the table without removing the cable.

Remove Top Covers

1. Hold the top cover and unscrew the screws.



3482

Fig. 4-59

2. Hold the top cover and disconnect the emergency stop button.

Fig. 4-60

3. Remove the top cover.

Remove Lower Covers

1. Unscrew the screws.
2. Unscrew the locking screws and release the hatch.

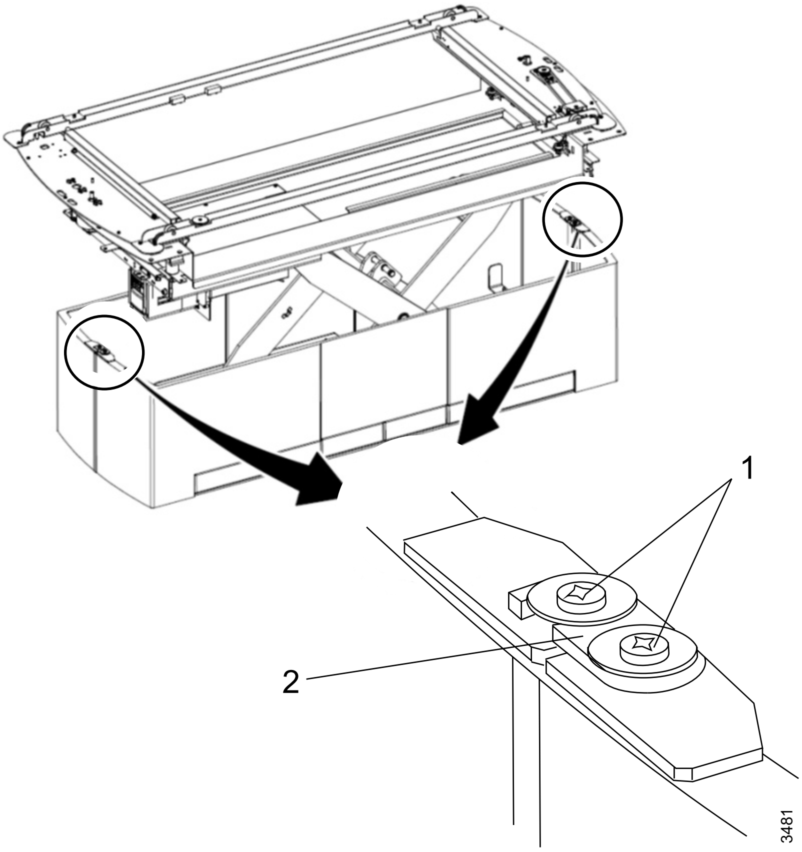


Fig. 4-61

1. *Locking screws*
2. *Hatch*

3. Lift up and remove lower cover.

4.12.1.3 Unload Closed Table

WARNING!

Do not sit on the table until it is attached to the floor.

The table may overturn when not bolted to the pallet or the floor.

CAUTION!

Before unloading the table, verify that the safety clamp is attached in transport position, see 4.24 Safety Clamp Closed Table, Page 205.

1. Release the table from the pallet, by removing the bolts.

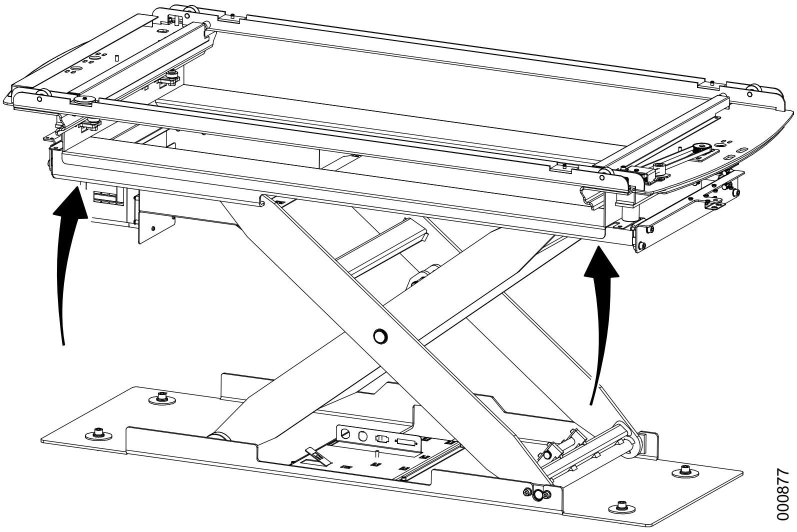


Fig. 4-62 .

2. Slide off the table from the pallet by grabbing underneath the table frame.
3. Move the table to the approximately right position.

Note!

Do no yet bolt the table!

4.12.2 Two Column Table (option)

4.12.2.1 Orientation of Two Column Table

Before placing the table on the floor, check for enough free space around the table, to allow free movement.

See the Planning Guide for further information of required space around the table. Plan the positioning of the table in accordance with the room layout.

Clearance to Wall

Note!

According to IEC60601-1 clause 9.2.2.2, the clearance between the table top and the wall shall be minimum 500 mm.

There are squeezing hazards between the moving table top and the wall. The measurements in the figure are important, according to IEC60601-1 clause 9.2.2.2.

Consider maximum cable length. The mechanical stop can be moved closer to the center of the table top. The stroke of the table top will then be shorter.

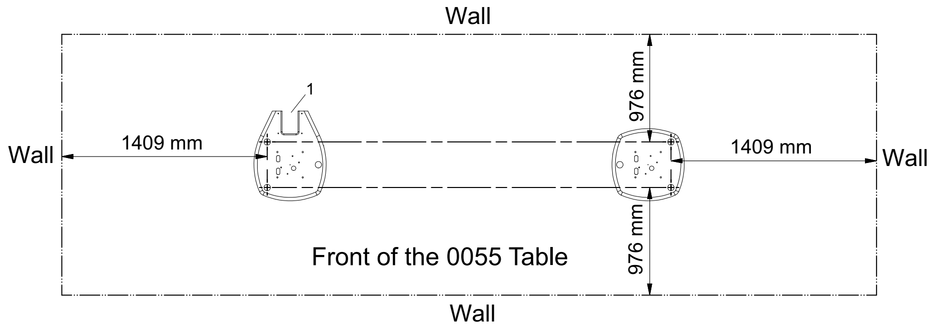


Fig. 4-63 Necessary space, table movement

Cable Duct in Floor

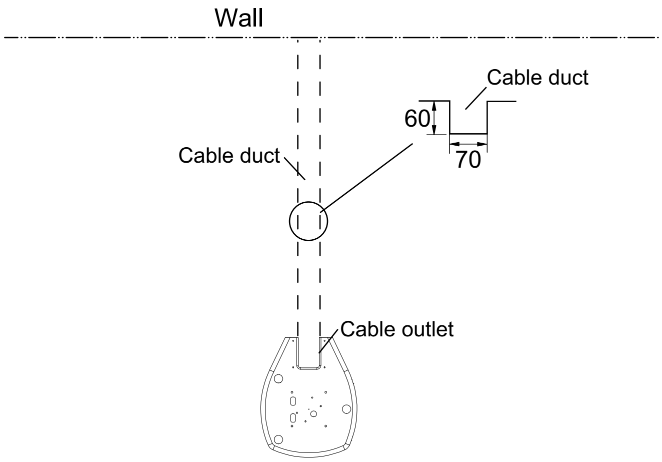


Fig. 4-64 Cable duct in the floor

4.12.2.2 Unload Two Column Table

WARNING!

Do not sit on the table until it is attached to the floor.

The table may overturn when not bolted to the pallet or the floor.

WARNING!

Do not tilt the table when unloading.

The columns may bend towards the middle when the table is lifted.

Two persons must keep the columns vertical.

1. Slide/lift off the table from the pallet by grabbing underneath the table frame.
   Do not tilt the table, keep the columns vertical.
2. Place the insulation plate (A) under the footplates.

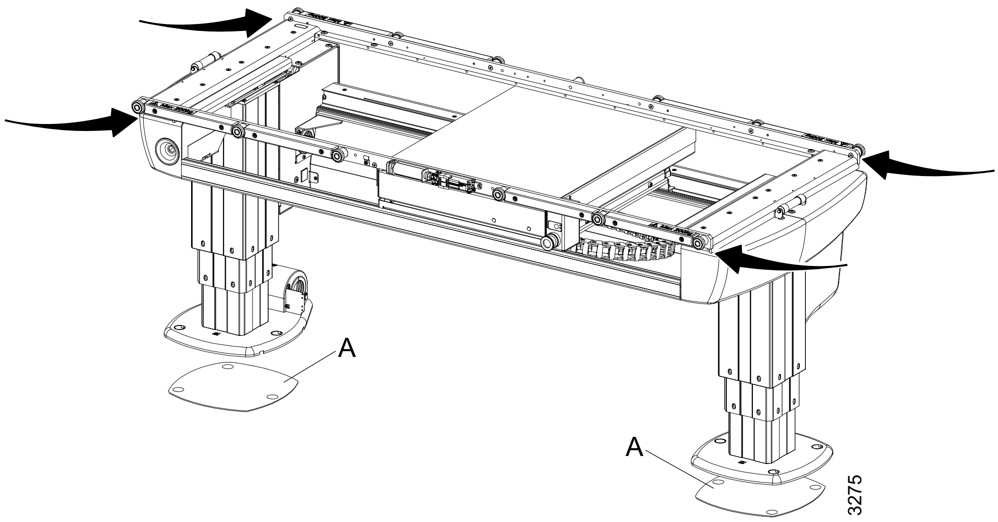


Fig. 4-65 Insulation and alignment

Transport Protection, Detector Holder

Remove the transport protection of the detector holder, one on each side.

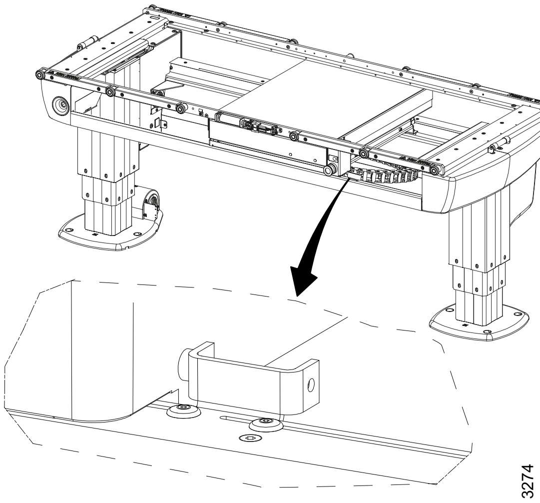


Fig. 4-66

4.13 Electrical Installation Of Table

4.13.1 Connect Table

Note!

The cables must be installed covered.

They shall not be placed on the floor.

Connect the table according to the figures.

Wiring to electrical plate 4.2 is made according to cable path 2, see **Table 4-3**.

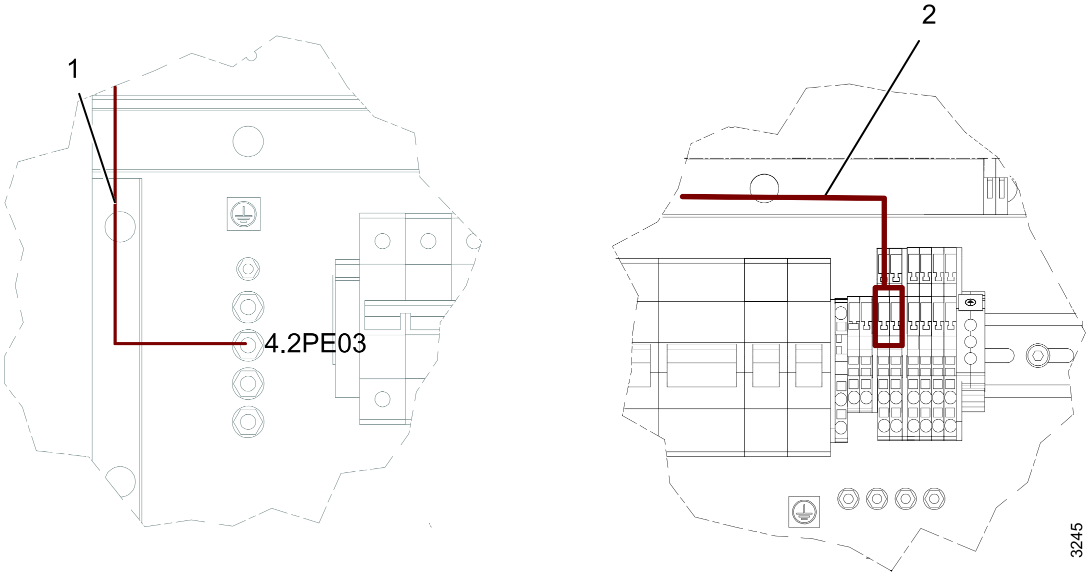


Fig. 4-67 Connecting the table

1. *2.0PE01 – 4.2PE03*
2. *2.0POW01 – 4.2J01 19-20*

Wiring to electrical plate 4.4 is made according to cable path 3, see **Table 4-3**.

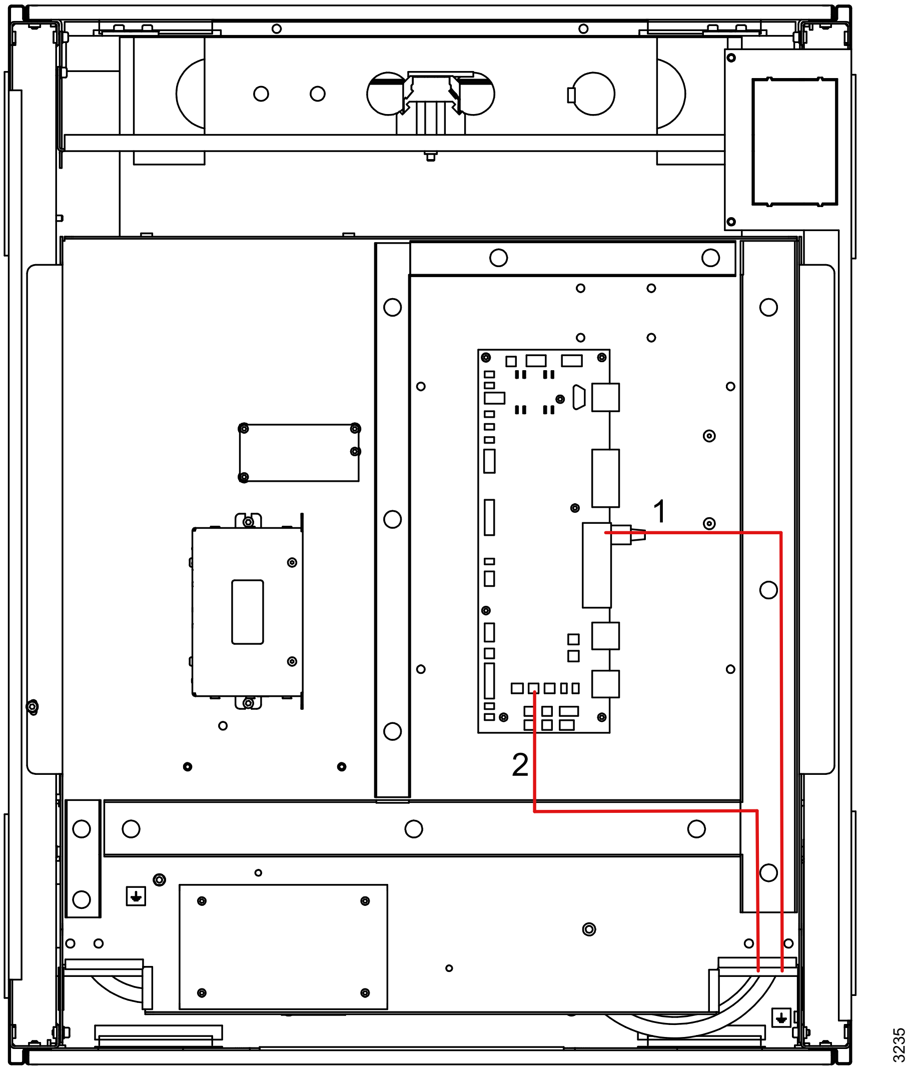


Fig. 4-68 Connecting the table

1. *2.0CAN01 – 4.4FIB01 J28–P4*
2. *2.0SIG01 – 4.4FIB01–J19*

Wiring to the generator is made according to cable path 1, see **Table 4-3**.

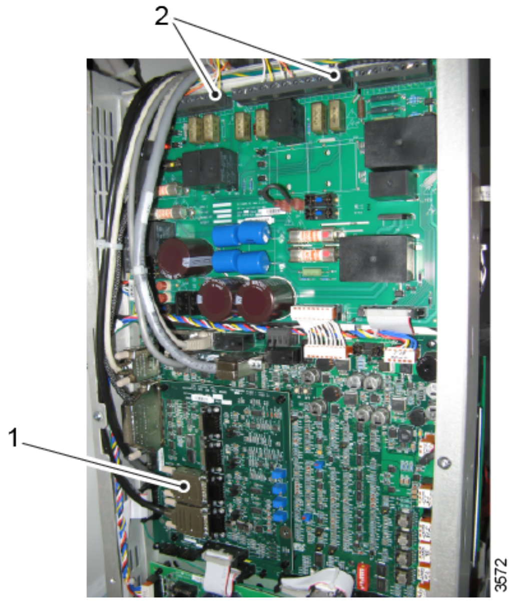
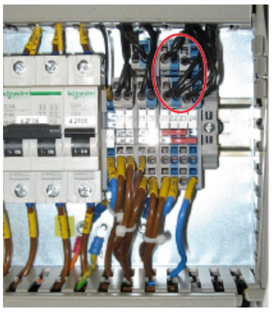
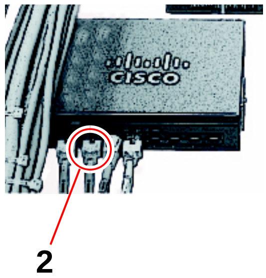


Fig. 4-69 Connecting the table AEC

1. *2.0SIG03 – GEN-J2*
   2.DB3C01 – GEN-J2 (option)
2. *2.DI/F01 – Gen (option)*
   A1 J2–7
   A2 J2–8
   B1 J4–5
   B2 J4–6

Table 4-5 Table detector installation

2.DPOW01 or 2. DPOW02	Wiring shall be done according to cable path 2, see **Table 4-3**.	
	4.2J01 21–22	
	Wiring shall be done according to cable path 4, see **Table 4-3**.	
2.DLAN01 or 2. DETH01	4.5HUB01–2	

4.14 Installation of Wireless Access Point (option)

WARNING!

The wireless access point must be installed out of reach from patient and user.

Note!

The cables must be installed covered.

They shall not be placed on the floor.

Note!

The wireless access point is only used with the wireless detector.

1. Install the wireless access point at the wall in the x-ray room out of reach from patient and user.
2. Connect cable 5.0WLAN01 to connection 1.

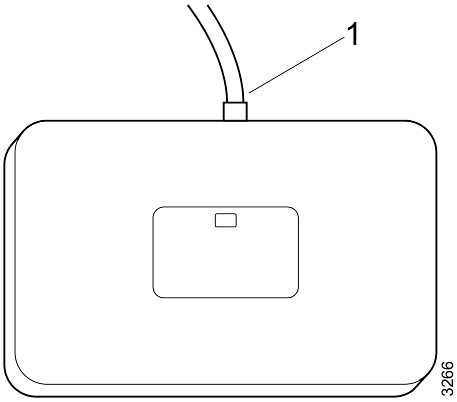


Fig. 4-70

3. Connect cable 5.0WLAN01 to 4.5HUB01-4 in the system cabinet.

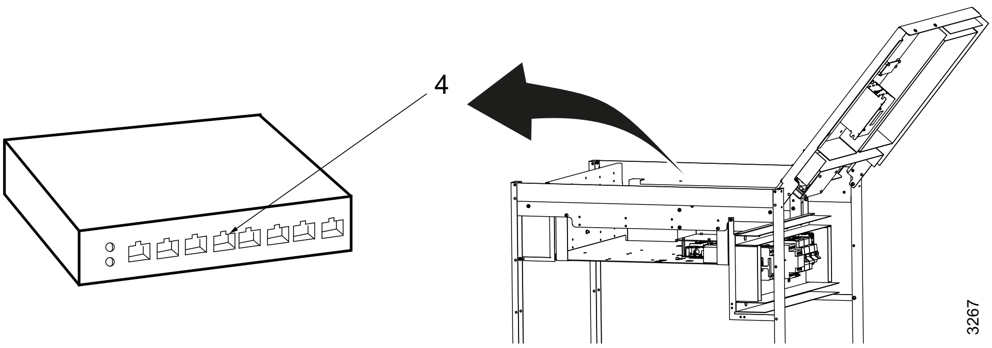


Fig. 4-71

4.15 External Exposure Handle (option)

There is an option to connect an external exposure handle, see **Fig. 4-72**.

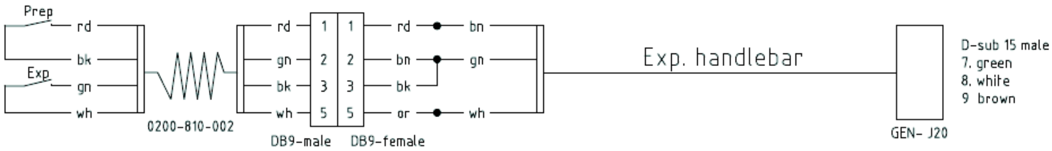
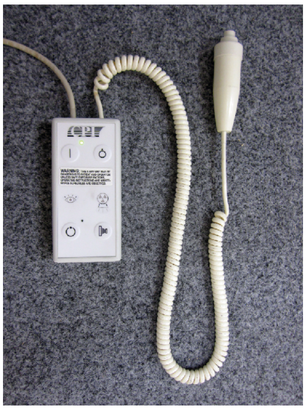


Fig. 4-72

4.16 Electrical Installation of Mini Console

Position the mini console in the operation room and connect cable CPI 732 091–00 between the mini console and the cabinet.

	
Connecting Mini Console	Cable 732 091–00 is hanging, rolled together, inside the cabinet.

4.17 Measure Protective Earth

WARNING!

The mains power must be switched off before the mains protective earth cables are disconnected.

4.17.1 Measure Isolation Between Hospital Protective Earth and System

Use a medical electrical safety analyser to indicate protective earth resistance. If such device is not available, a visual or audible device (Ohmmeter, buzzer, etc.) may be used.

1. Measure the resistance between hospital protective earth and system protective earth.
2. The resistance value must be ∞ Ω.

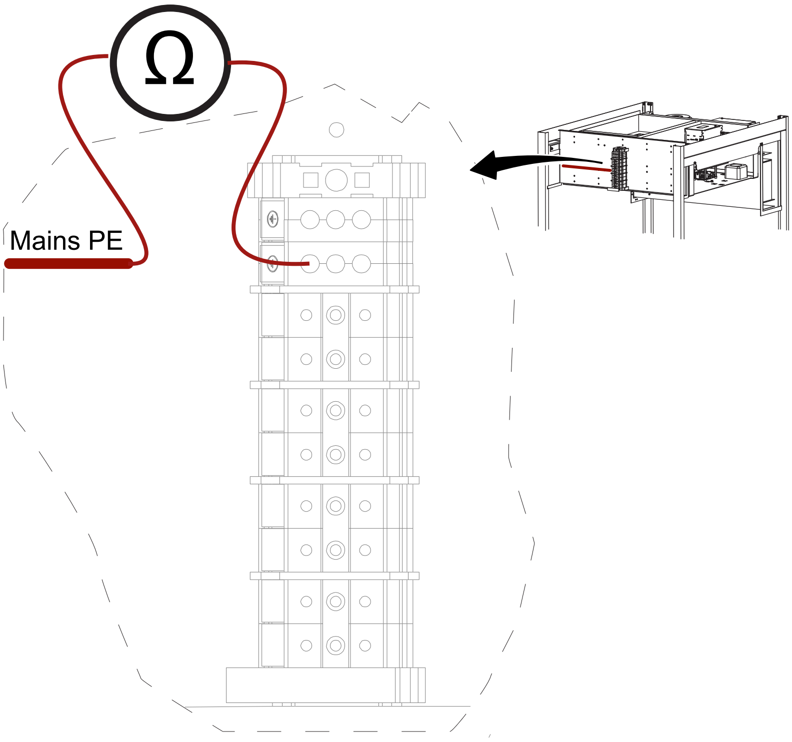


Fig. 4-73 Measure isolation

If any resistance is measured, there is a connection between the system and the hospital protective earth, e.g. a bolt is touching a concrete reinforcement mesh.

The connection to the hospital protective earth must be removed before continuing.

– Check the correct mounting of all insulation plates and insulation cases of table and wallstand.

  Remove the bolts, one at a time and measure until the connection is found.

– Make sure no external equipment is connected to the system.

  Disconnect the image system PC connections to both mains supply and all connections to the system (ethernet and RS232).

4.17.2 Protective Earth Subsystem

Use a medical electrical safety analyser to indicate protective earth resistance. If such device is not available, a visual or audible device (Ohmmeter, buzzer, etc.) may be used.

Protective earth is measured to ensure that all cables are correctly connected.

The measured value must be < 0,1 Ω.

1. Make sure the protective earth cables from table, wallstand and OTC are connected and the bolts are tightened, see **Fig. 4-74**.

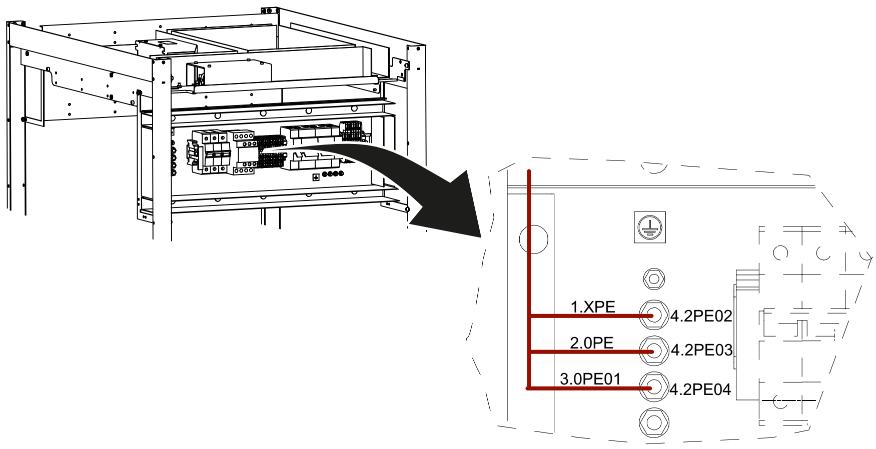


Fig. 4-74 Protective earth 4.2

2. Measure the continuity between the ground terminal 4.1PE01 and the 1.CS.

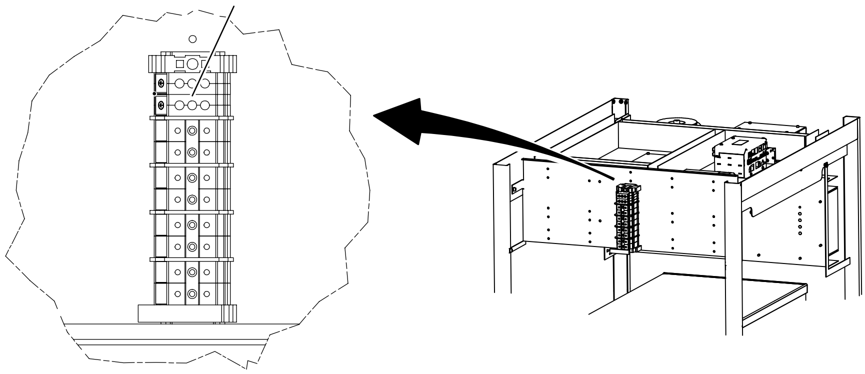


Fig. 4-75 Measuring point 4,1PE01

A Measuring point 1.CS.

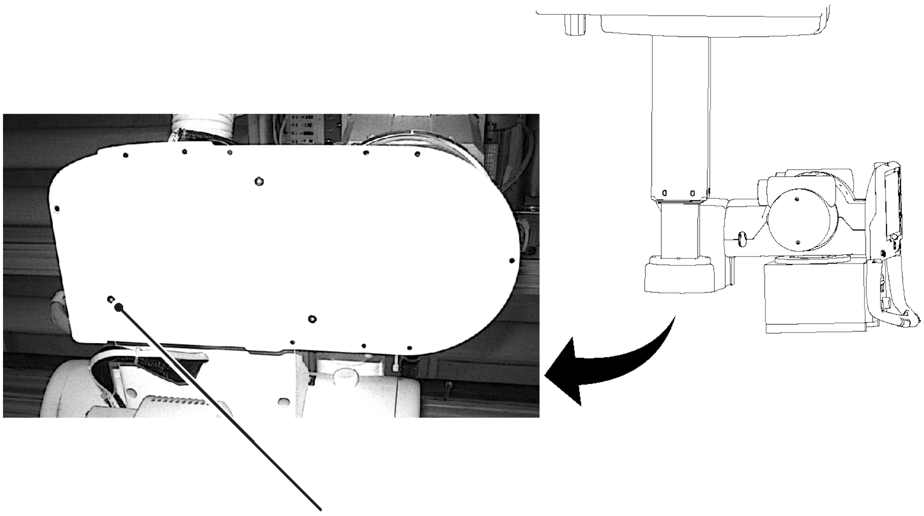


Fig. 4-76 Measuring point 1.CS

B Measure the continuity between the ground terminal 4.1PE01 and the 2.CS.

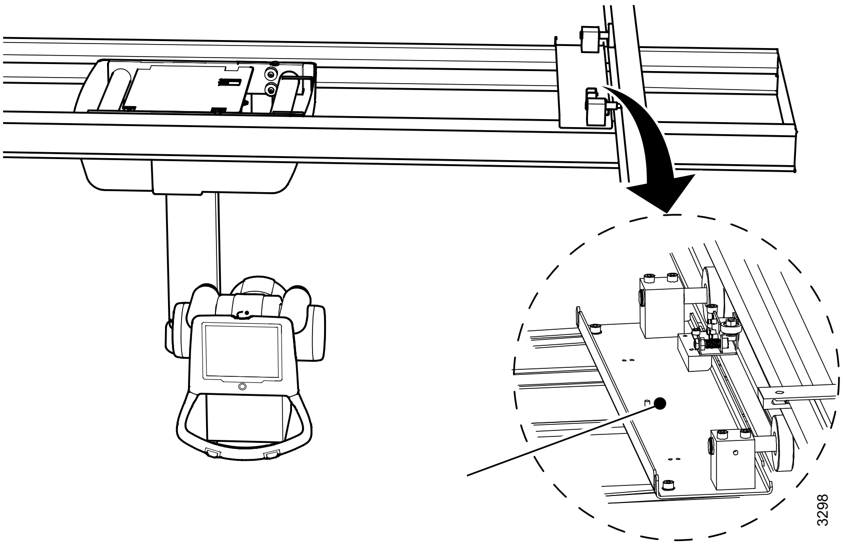


Fig. 4-77 Measuring point 2.CS

C Measure the continuity between the ground terminal 4.1PE01 and the 1.WS.

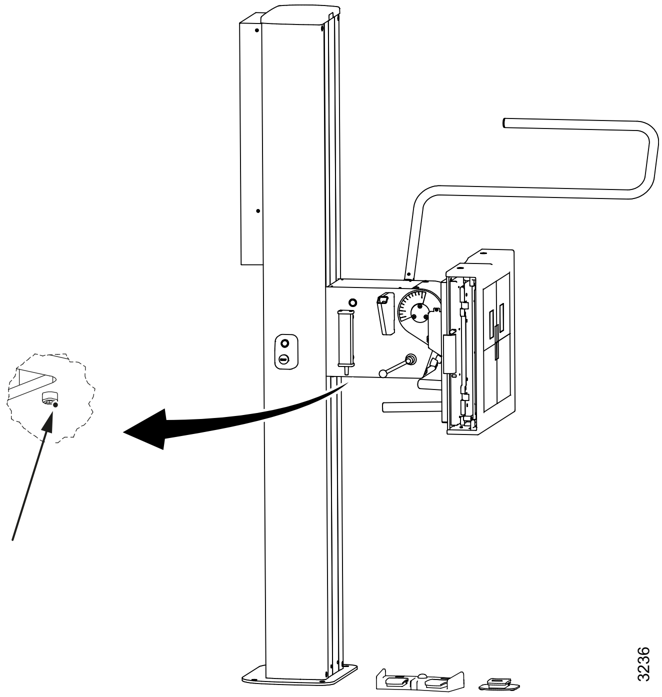


Fig. 4-78 Measuring point 1.WS

D Closed table:

Measure the continuity between the ground terminal 4.1PE01 and the measuring points 1.TS and 2.TS.

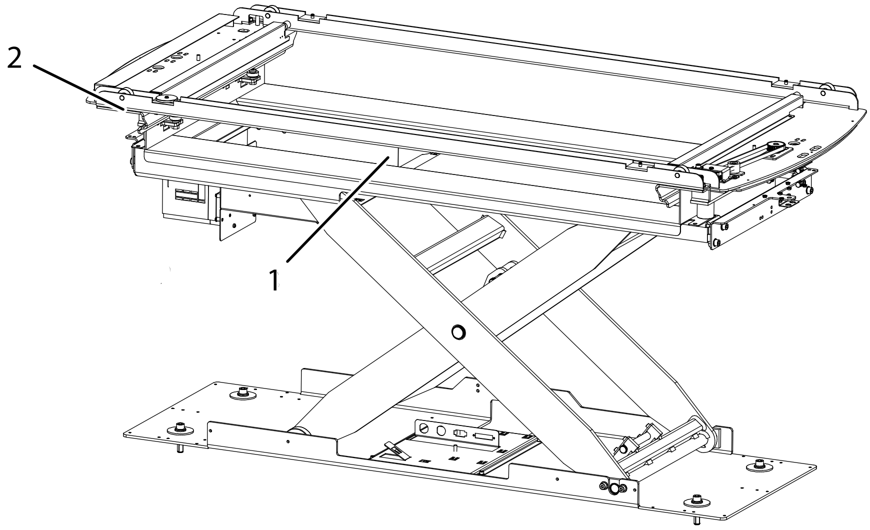


Fig. 4-79 Measuring points closed table

1.TS (detector holder wagon)

2.TS (table frame wagon)

E Two column table (option):

Measure the continuity between the ground terminal 4.1PE01 and the measuring points brake 2.2 Bra01 and Z1 foot plate.

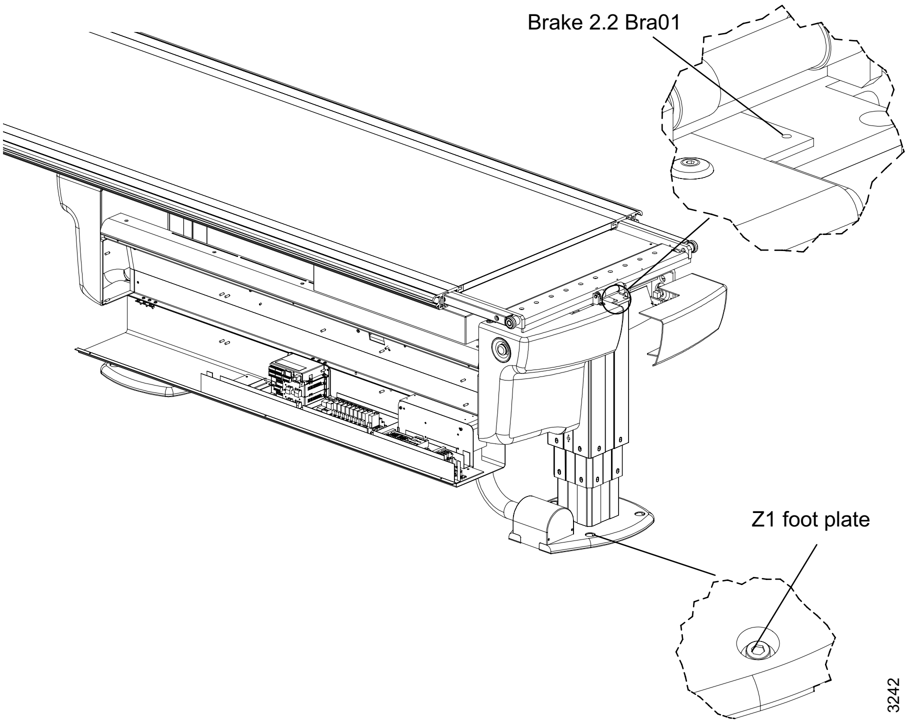


Fig. 4-80 Measuring points two column table (option)

4.18 Electrical Building Installation

The Machinery directive 2006/42/EC requires the system to be fitted with means to isolate it from all energy sources.

WARNING!

This equipment must only be connected to supply mains with protective earth.

WARNING!

Always turn off the power and lock the main switch before service or maintenance.

Note!

A lockable disconnecting device on the mains, to disconnect the system from mains power, must be installed according to national wiring rules

4.18.1 Power Ratings and Line Requirements

The product requires a three-phase electrical line with a protective earth ground (4 or 5 wires).

The transformers in the system cabinet, requires a tap configuration.

The generator has an automatic main line selection (no transformer tap configuration required).

The voltage has to be manually set to:

- 3 Phase VAC ±10%
- 400 VAC 50/60 Hz
- 480 VAC 50/60 Hz
- 400 VAC with neutral 50/60 Hz
- maximum wire gauge 4 AWG (25 mm²)
- required fuse 63 A B curve thermal breaker

Having selected the voltage, make a mark at the system serial number label, at the related check box for the power rating.

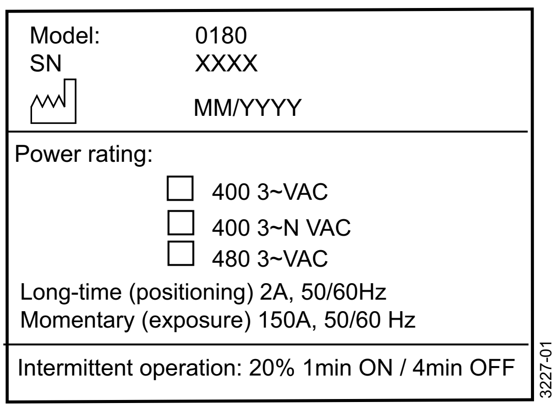


Fig. 4-81

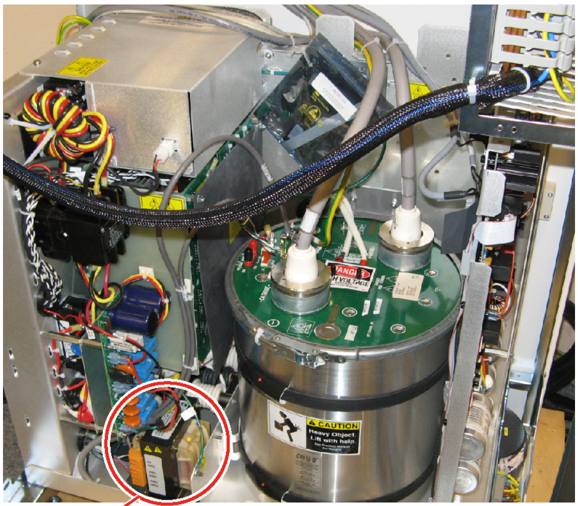
Generator Series and Mains Voltage	Minimum Recom-mended **Mains Discon-nect to Generator (15 ft/5 m maxi-mum)**	**Generator Momenta-ry Line Current**	Minimum Recom-mended **Generator Service Rating**	Minimum Recom-mended **Distribu-tion Trans-former Rating**	Minimum Recom-mended **Ground Wire Size**	**Apparent Mains Resist-ance**
50kW 400 VAC, 3p.	(13.3 mm^2)	100 A	100 A	65 kVa	(13.3 mm^2)	0.17 Ω
65kW 400 VAC, 3p.	(13.3 mm^2)	125 A	100 A	85 kVa	(13.3 mm^2)	0.13 Ω
80kW 400 VAC, 3p.	(13.3 mm^2)	155 A	100 A	105 kVa	(13.3 mm^2)	0.10 Ω
50 kW480 VAC, 3p.	(13.3 mm^2)	80 A	100 A	65 kVa	(13.3 mm^2)	0.24 Ω
65 kW480 VAC, 3p	(13.3 mm^2)	105 A	100 A	85 kVa	(13.3 mm^2)	0.19 Ω
80 kW480 VAC, 3p	(13.3 mm^2)	130A	100 A	105 kVa	(13.3 mm^2)	0.15 Ω

Recommended service disconnect (as per the above table):

- All wiring and grounding should comply with the national electrical code or equivalent.
- All wiring must be copper.
- The disconnecting switch shall be located within reach of the operator.

4.18.2 Tap Configuration 400 VAC

Having selected the voltage, make a mark at the system serial number label, at the related check box for the power rating.



1

Fig. 4-82 400VAC

1. *Position of generator transformer.*

Check that the red wire is connected to 400V, at the generator transformer. See **Fig. 4-83**.

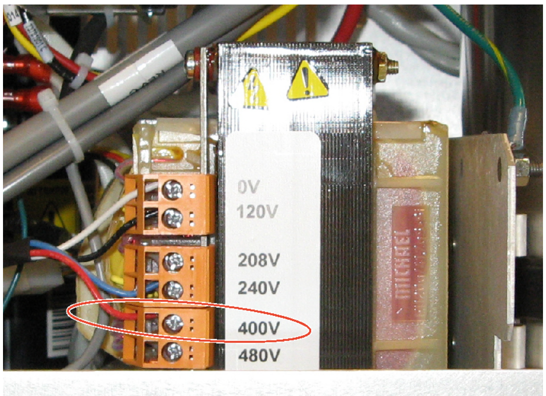
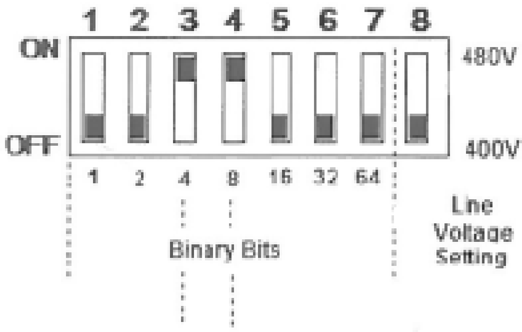


Fig. 4-83 Connection 400V

Check that the eeprom positioned at the generator, is marked with 400V. See **Fig. 4-84**.



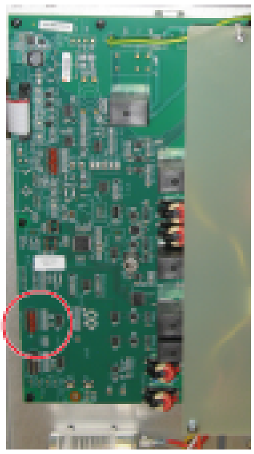


Fig. 4-84 400V eeprom positioned

Make sure the wire (A) is connected according to **Fig. 4-85**.

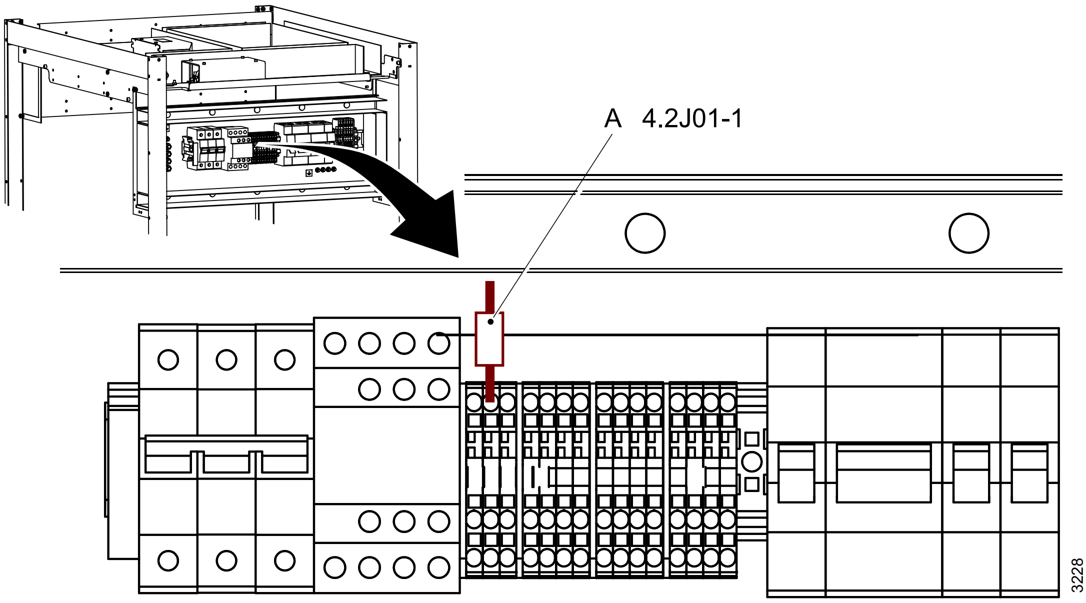


Fig. 4-85

Note!

If necessary, some extra wire jumpers are provided inside the cabinet.

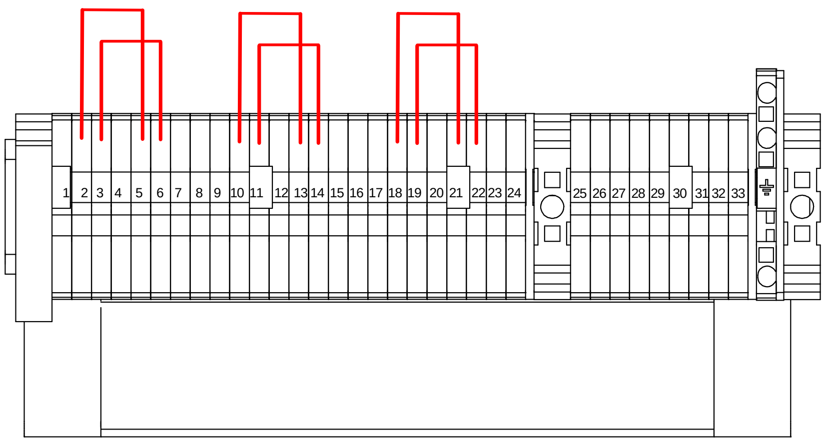


Fig. 4-86 390V

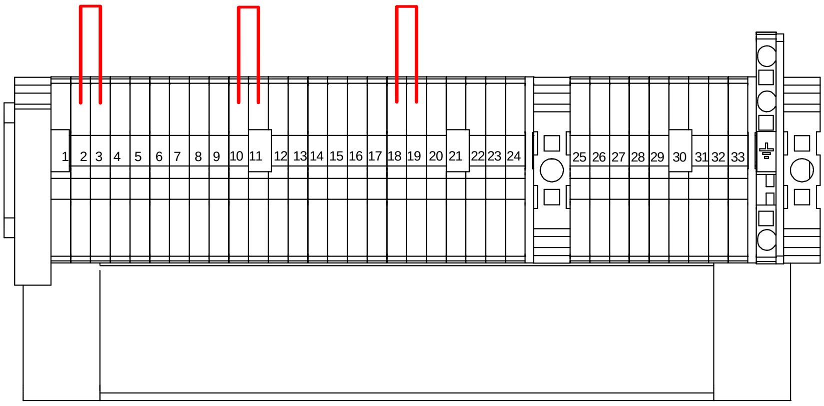


Fig. 4-87 400V

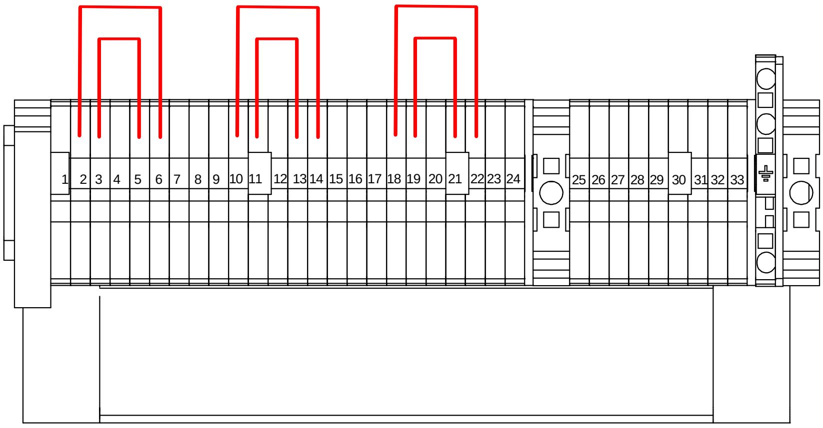


Fig. 4-88 410V

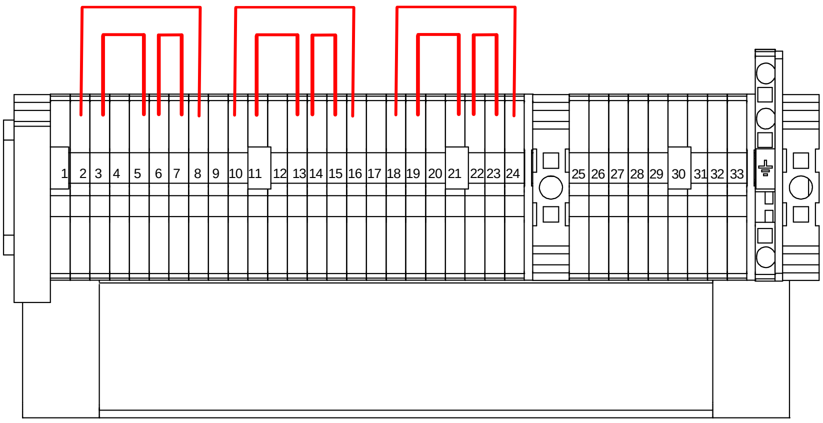


Fig. 4-89 420V

4.18.3 Tap Configuration 480 VAC

Having selected the voltage, make a mark at the system serial number label, at the related check box for the power rating.

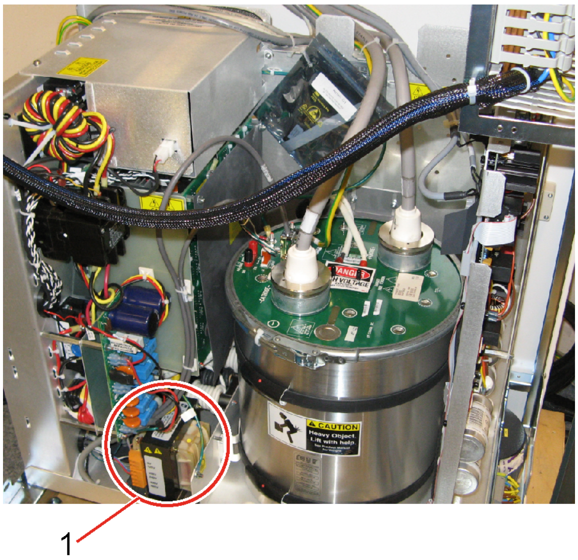


Fig. 4-90 480VAC

1. *Position of generator transformer.*

Check that the red wire is connected to 480 V, at the generator transformer, see **Fig. 4-91**.

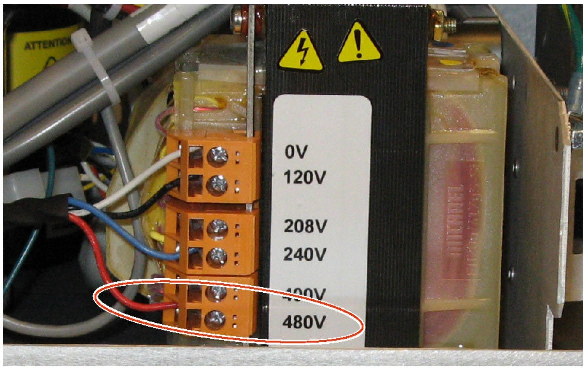
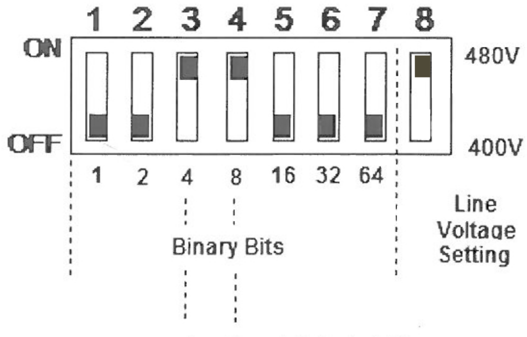


Fig. 4-91 480V connection

Check that the eeprom positioned at the generator is marked with 480V, see **Fig. 4-92**.



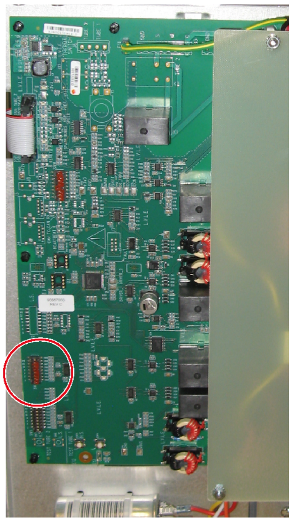


Fig. 4-92 480V eeprom positioned

Make sure the wire (A) is connected according to figure **Fig. 4-93**.

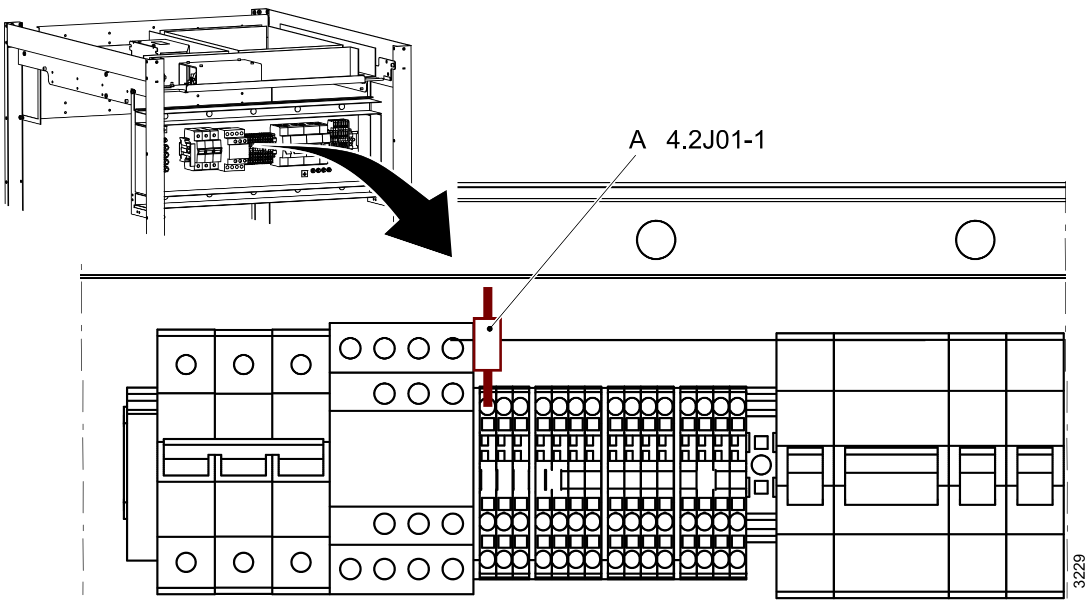


Fig. 4-93

Note!

If necessary, some extra wire jumpers are provided inside the cabinet.

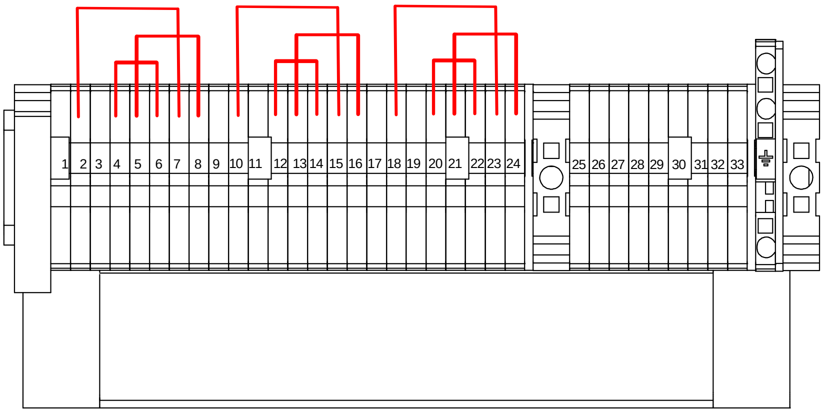


Fig. 4-94 460V

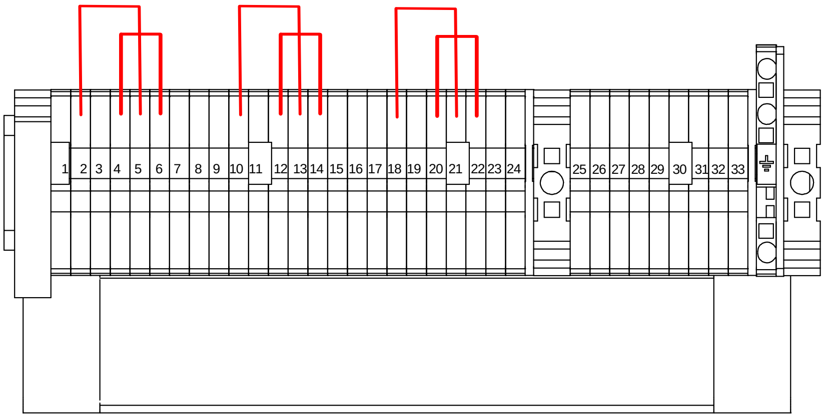


Fig. 4-95 470V

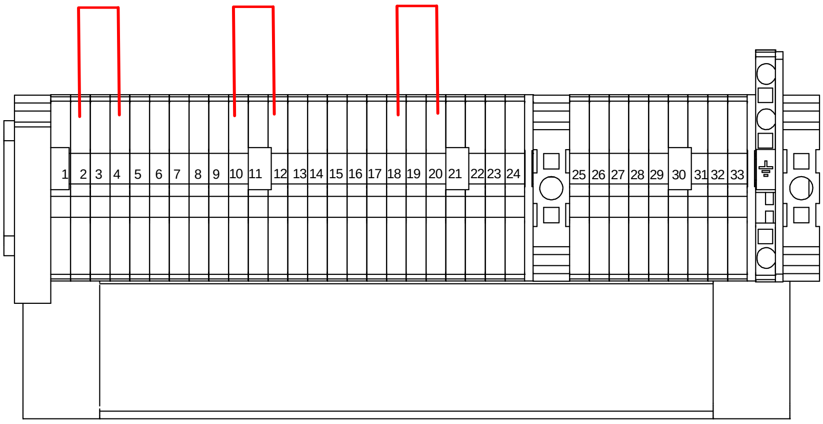


Fig. 4-96 480V

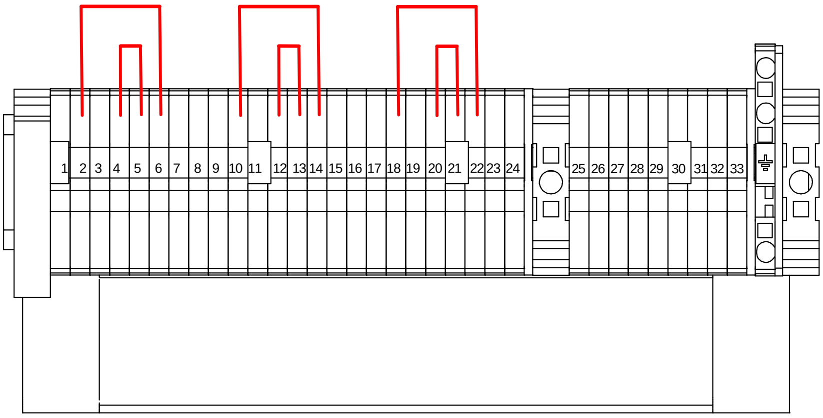


Fig. 4-97 490V

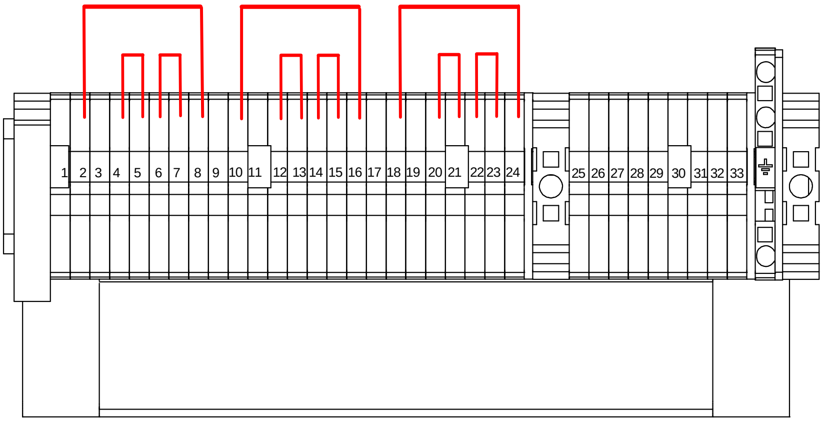


Fig. 4-98 500V

4.18.4 Electrical Installation of Mains Cable

Connect mains power and mains protective earth.

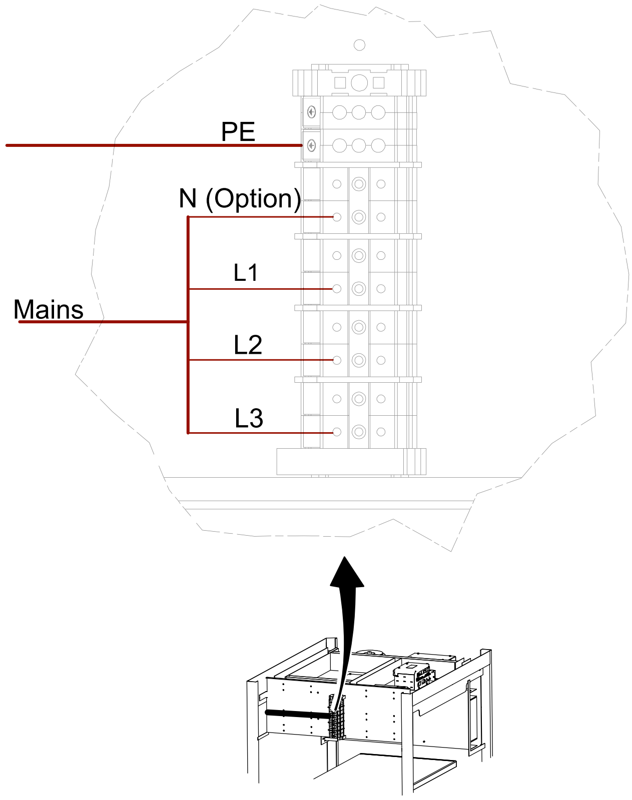


Fig. 4-99 Electrical installation of mains cable

4.19 Start-up Procedure

4.19.1 Check Voltage to the Subsystem

Switch off (press down) the fuses according to picture 1 and switch on the mains power to system with the mains switch.

Measure at the fuse 4.2F02 and 4.2F05 according to picture 2.

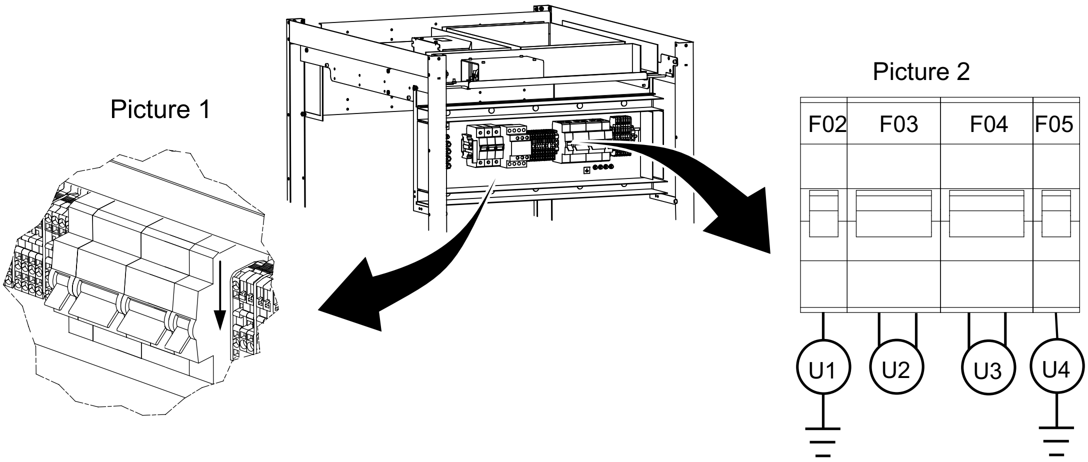


Fig. 4-100 Check voltage to the subsystem

- U1 = 230V ±10%
- U4 = 230V ±10%

If the measured value fails to correspond with the levels listed above, check the tap configuration, see **4.18.2 Tap Configuration 400 VAC** or **4.18.3 Tap Configuration 480 VAC**.

If the measured values correspond with the levels listed above, switch on (press up) 4.2F02.

Switch on the system from the mini console *"On"* button according to picture 3.

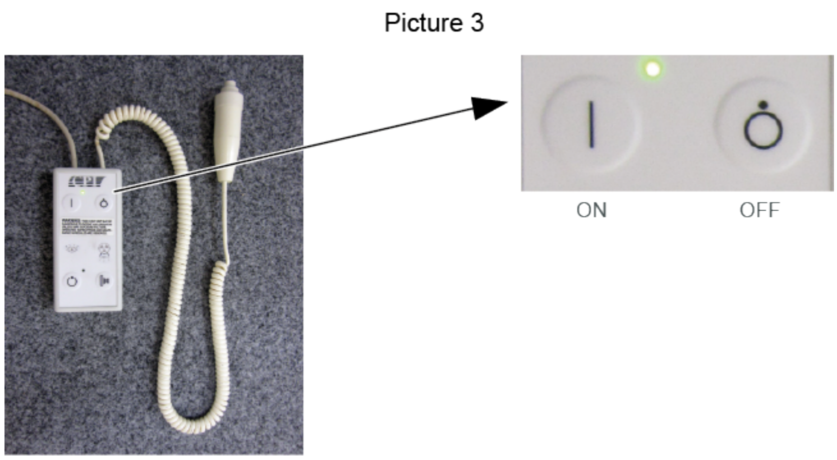


Fig. 4-101 Mini console

Measure at the 4.2F03 and 4.2F04 according to picture 2 in **Fig. 4-100**.

- U2 = 230V ±10%
- U3 = 230V ±10%

If the measured values correspond with the levels listed above, switch off the power at mini console *“Off “* button (picture 3 in **Fig. 4-101**) and switch on (press up) 4.2F03, 4.2F04 and 4.2F05.

4.20 Alignment of OTC

The ceiling rails Y must be in level ±1 mm, see **4.6.1 Ceiling Rails Y, Page 115**.

Check Tube Angle

1. Switch on the system from the mini console.
2. Check that the collimator is in index position.
3. Place a spirit level on the OTC tube and check that the tube is horizontal (±1°).

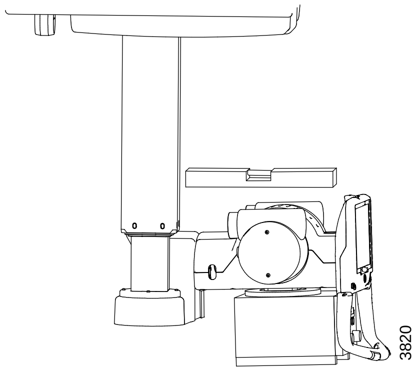


Fig. 4-102 Checking alignment

4. Mark a cross on a paper placed on the floor.
5. Turn on the collimator light and center the light field on the cross.

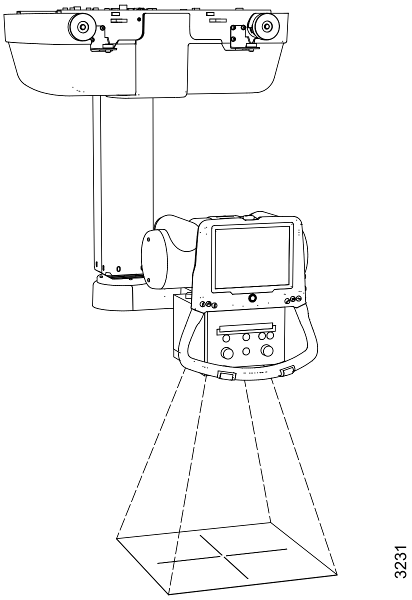


Fig. 4-103 OTC alignment

6. Drive the column upward and downward. The center of the collimator light field must stay on the cross.

   If the collimator light field moves in Y-direction, see
   4.20.1 Adjust Tube Angle, Page 197.

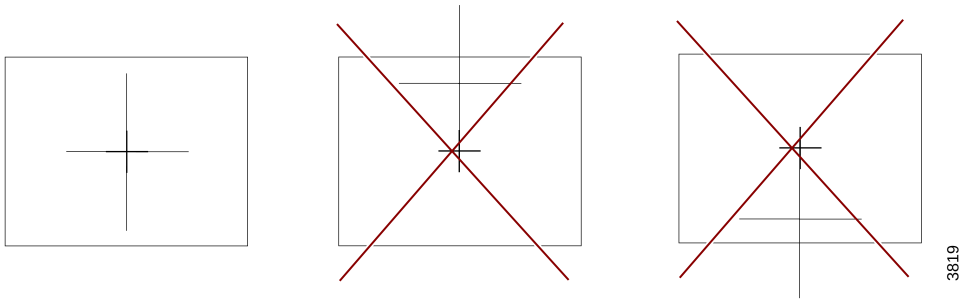


Fig. 4-104 Y-direction, paper marks

Check Alpha Index Position

7. Place a spirit level on the OTC tube and check that the tube is horizontal (±1°).

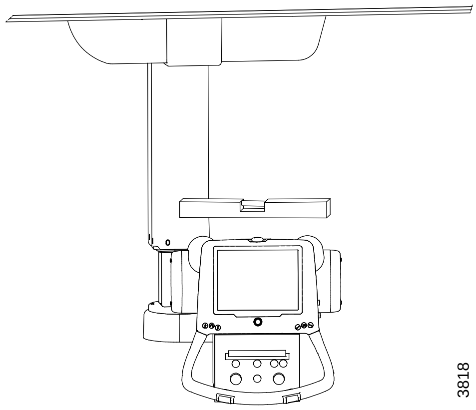


Fig. 4-105 Checking alignment

8. Center the collimator light field on the cross on the paper placed on the floor, see **Fig. 4-103**.

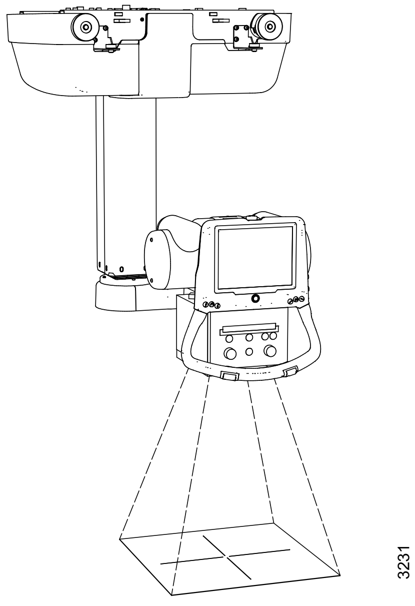


Fig. 4-106 OTC alignment

9. Drive the column upward and downward. The center of the collimator light field must stay on the cross.

   If the collimator light field moves in X-direction, see **4.20.2 Adjust Alpha Index Position, Page 198**.

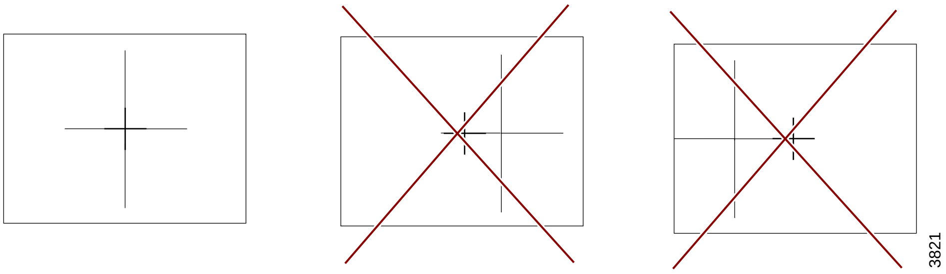


Fig. 4-107 X-direction, paper marks

Check Beta Index Position

10. Mark a cross on a piece of paper placed on the wall.
11. Center the collimator light field on the cross.

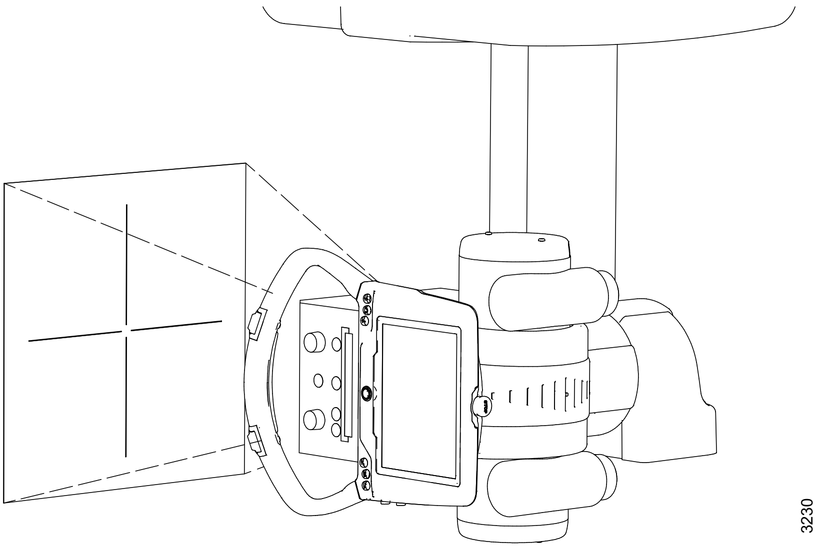


Fig. 4-108 OTC vertical alignment

12. Move the OTC backward and forward.
    The center of the collimator light field must stay on the cross.
    If the collimator light field moves, see **4.20.3 Adjust Beta Index Position, Page 200**.

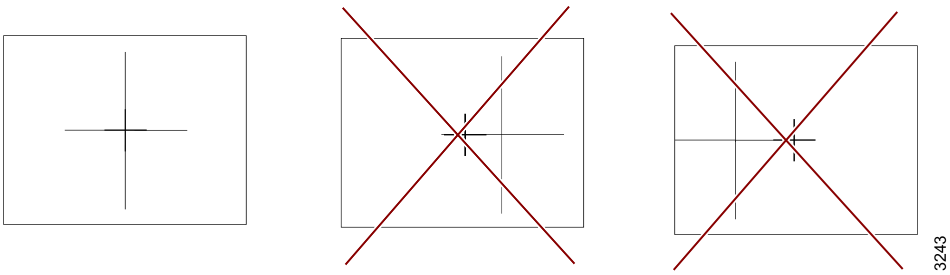


Fig. 4-109 Z-direction, paper marks

4.20.1 Adjust Tube Angle

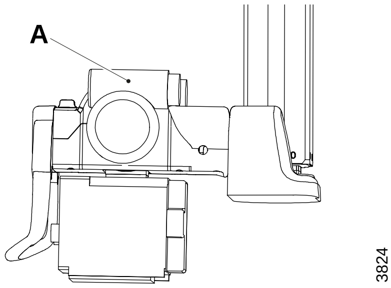


Fig. 4-110

1. Remove the cover (A).

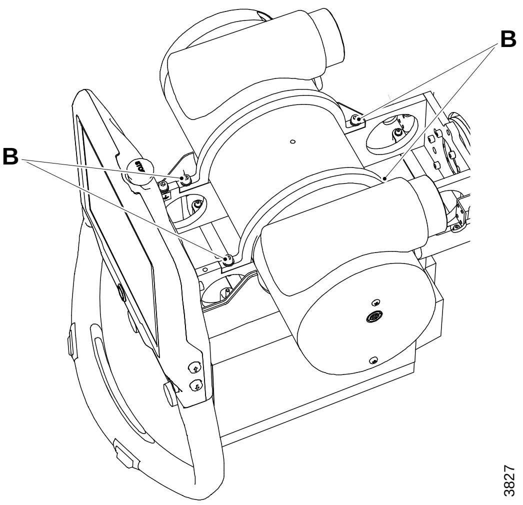


Fig. 4-111

2. Loosen the screws (B).

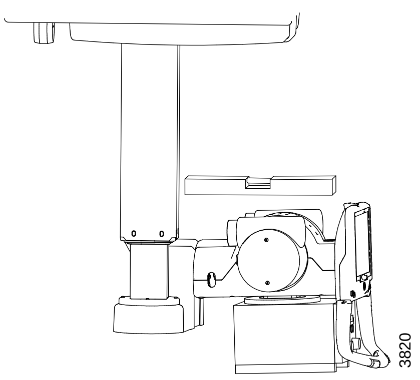


Fig. 4-112 Checking alignment

3. Adjust the tube angle, use a spirit level.

4. Tighten the screws (B).
5. Drive the column upward and downward and verify that the center of the collimator light field stays on the cross. Adjust if necessary.
6. Reassemble the cover.

4.20.2 Adjust Alpha Index Position

1. Remove the plate (A).

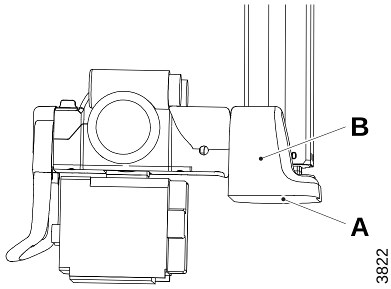


Fig. 4-113

2. Remove the covers (B).
3. Loosen the three screws (C).

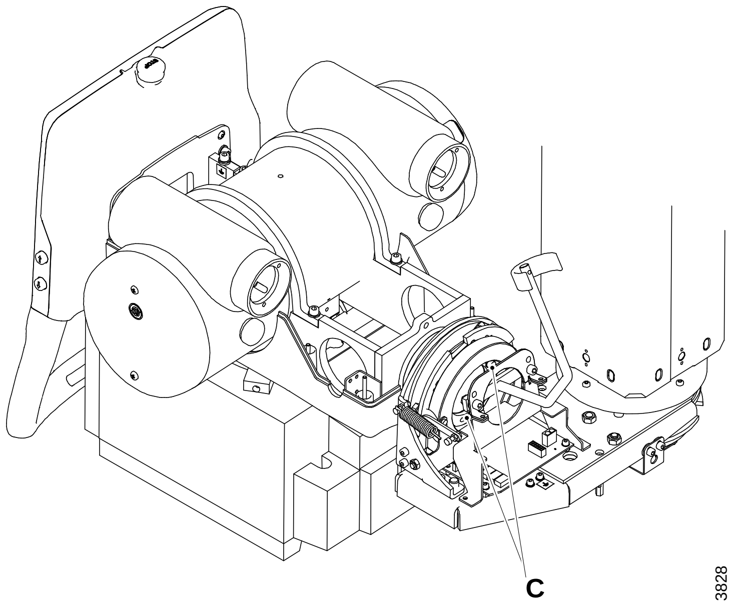


Fig. 4-114

4. Adjust the tube to horizontal level, use a spirit level.

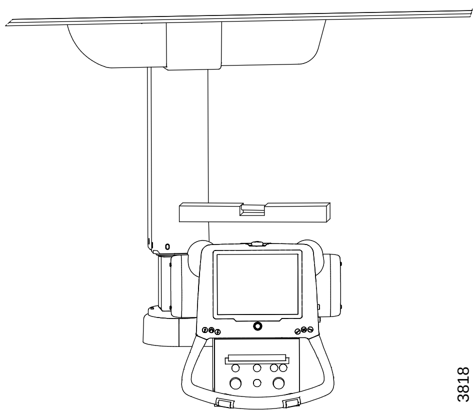


Fig. 4-115 Checking alignment

5. Tighten the screws (C).
6. Drive the column upward and downward and verify that the center of the collimator light field stays on the cross. Adjust if necessary.
7. Reassemble the cover and the plate.

4.20.3 Adjust Beta Index Position

1. Remove the plate (A).

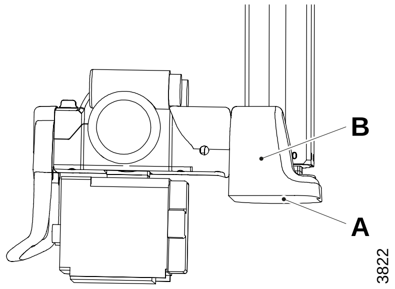


Fig. 4-116

2. Remove the covers (B).
3. Loosen the screws (C).

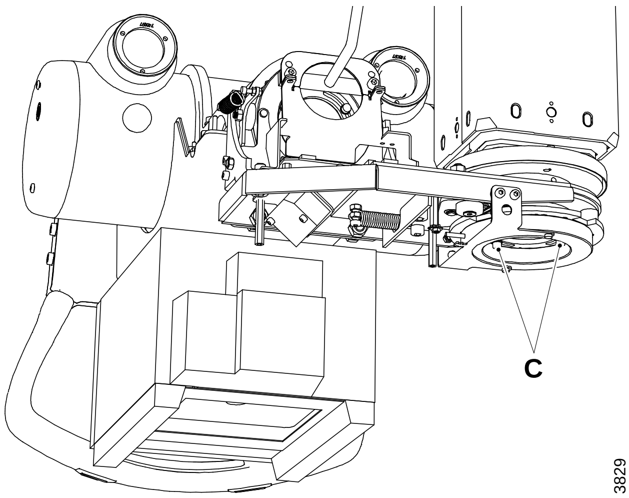


Fig. 4-117

4. Adjust the center of the collimator light field to the cross, see **Fig. 4-109**.
5. Tighten the screws (C).
6. Move the OTC backward and forward and verify that the center of the collimator light field stays on the cross. Adjust again if necessary.
7. Reassemble the cover and the plate.

4.21 Alignment of Wallstand

1. Place a spirit level on the column and check that the wallstand is level.
2. Move the OTC and place the collimator 10 mm from the detector holder of the wallstand according to **Fig. 4-118**.
3. Move the OTC sideways, measure the distance.
   The distance should be 10 mm.
4. If needed, adjust the wallstand position.
5. Mount the remaining bolts to the floor, see **4.10.3 Attachment of Wallstand, Page 143**.

Note!

It is important to mount the remaining bolts to the floor.

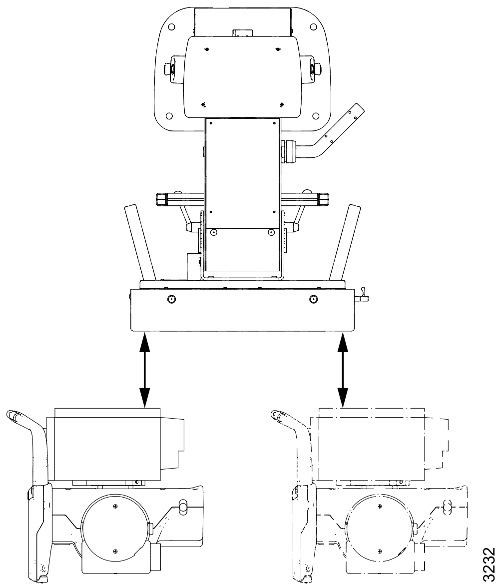


Fig. 4-118 Alignment of wallstand

4.21.1 Measure Isolation Between Hospital Protective Earth and System

WARNING!

The mains power must be switched off before the mains protective earth cables are disconnected.

See **4.17 Measure Protective Earth, Page 175**.

4.22 Alignment of Table

1. Move the table and place the collimator above the table frame.
2. Light up the collimator and place the light field on the detector.
3. Move OTC and detector and observe the alignment.
4. If needed, adjust the table position.

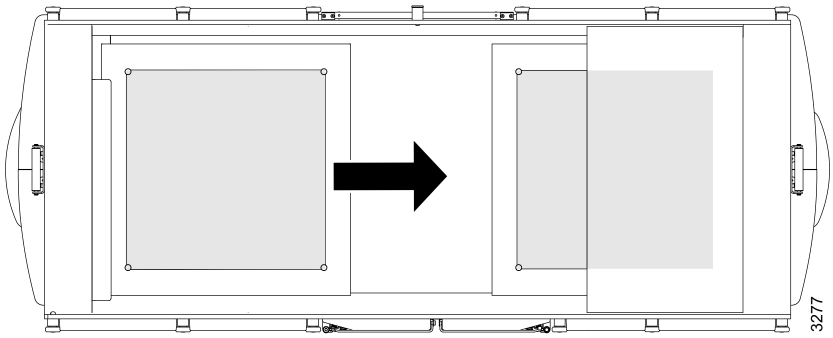


Fig. 4-119

4.22.1 Closed Table

1. Place a spirit level on the center of the table top.
   The table shall be 90° with a tolerance of ±0.5°.
2. Use shims to adjust differences in the floor gradient.
   It is possible to use shims up to 20 mm.
   Shims should be under the whole track for the wheels, see marks in the figure below.

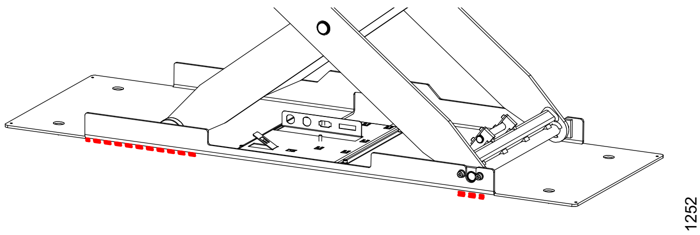


Fig. 4-120 Adjusting horizontal alignment

4.22.2 Two Column Table (option)

1. Place a spirit level on the column and check that the column is vertical (±0.5°). Check two adjacent sides of each column.

   Adjust if necessary, use shims.

2. Use the installation tool (B) on adjusting screw (C). The adjusting screw is only for alignment.

More than 50% of the insulation plate must be in contact with the floor.

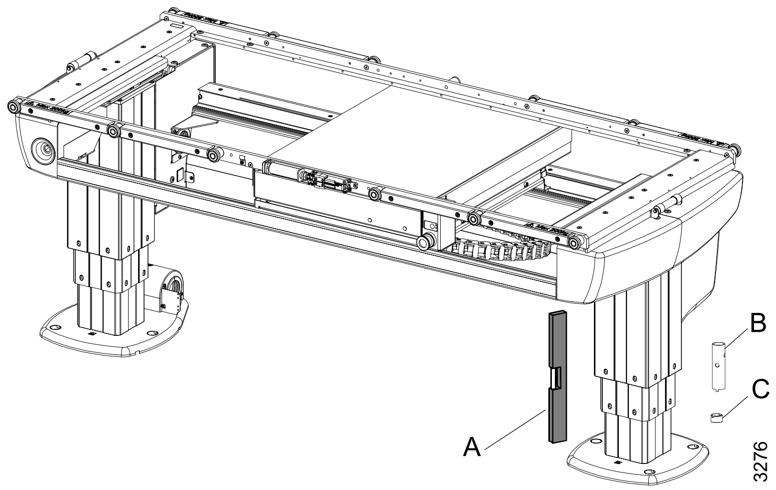


Fig. 4-121 Alignment of two column table

4.23 Attachment of Table

The table must be installed on a solid base with sufficient load capacity. The floor must be able to withstand the pull forces supplied on the drive-in anchor.

The maximum deviation between the floor attachment points should be ±10 mm, see further requirements on the floor in the planning guide.

Drill size:	12 mm
Anchor, total length:	45 mm

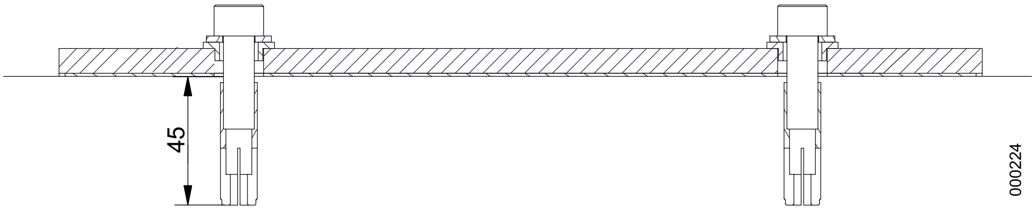
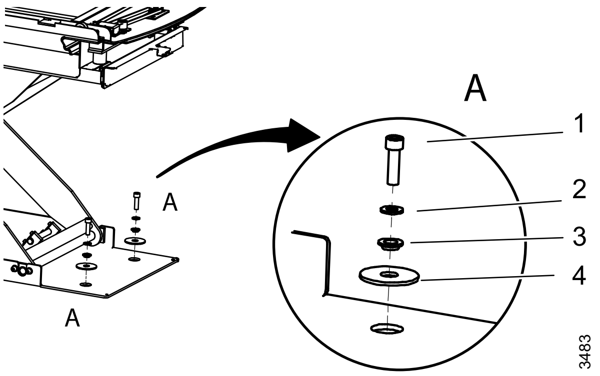
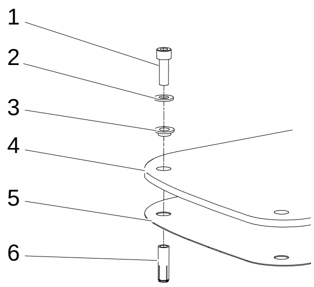


Fig. 4-122

1. Drill a hole.
2. Clean the drilled hole.
3. Knock in drive-in anchor until flush.
4. Insert and knock spreading tool to expand drive-in anchor.
5. Attach table. Tightening torque 25 Nm.



1 Bolt
2 Washer
3 Insulation case
4 Washer



1 Bolt
2 Washer
3 Insulation case
4 Bottom plate
5 Insulation plate
6 Drive-in anchor

4.24 Safety Clamp Closed Table

WARNING!

Set the safety clamp in operation position (parking position) before starting to move the table in Z-direction.

WARNING!

Be careful when moving the safety clamp between different positions.

WARNING!

Do NOT enter under the table while power supply of the table is ON and the table is travelling vertically (up or down).

WARNING!

Turn off the system when you need to enter under the table in order to attach or detach the safety clamp or to install the table.

The safety clamp has three positions:

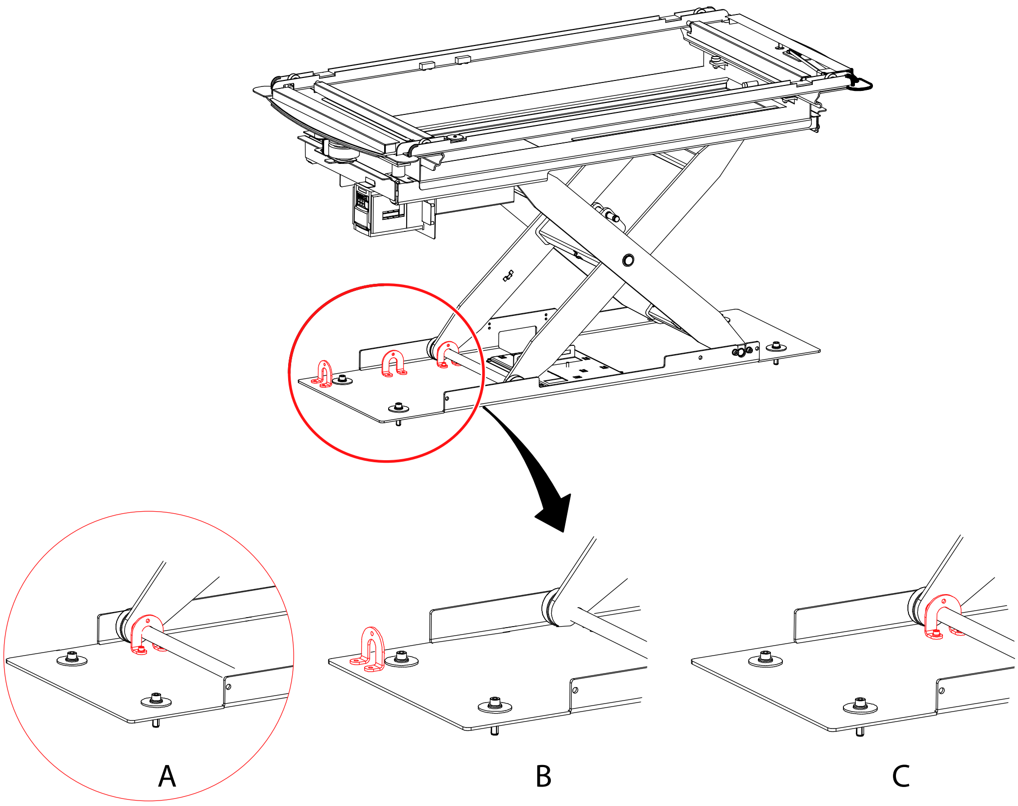


Fig. 4-123 Safety clamp positions

A Transport position
B Operation position (parking position)
C Service performance position

4.25 Micro Switch End Stops Closed Table

Check the upper and lower end stops for the table Z-direction. The lowest table position shall be 500 mm and the highest position 800 mm.

If necessary, make adjustments by loosening the valid screw, and then slide the micro switch to the correct position.

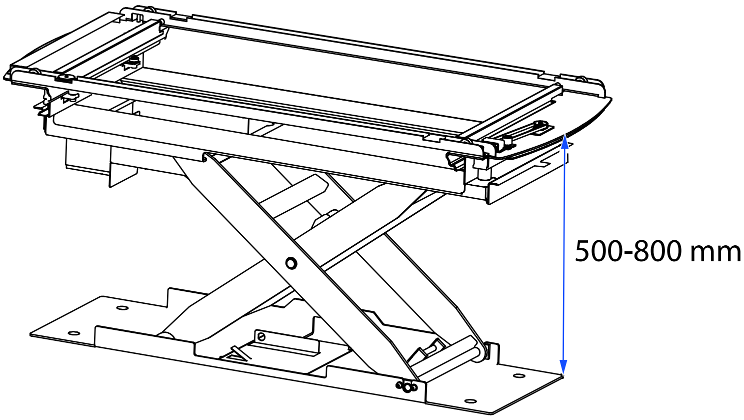


Fig. 4-124

The left micro switch is controlling the lower table end stop.

The right micro switch is controlling the upper table end stop.

4.26 Measure Isolation Between Hospital Protective Earth and System

WARNING!

The mains power must be switched off before the mains protective earth cables are disconnected.

See **4.17 Measure Protective Earth, Page 175**.

4.27 Installation of Table Top

4.27.1 Closed Table

1. Remove the mechanical end stops.

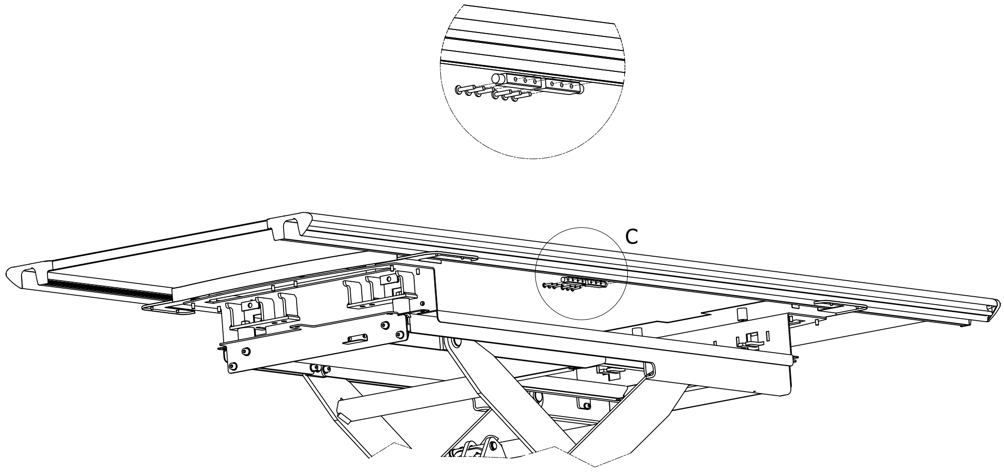


Fig. 4-125 Table mechanical stops

2. Remove the four end covers.

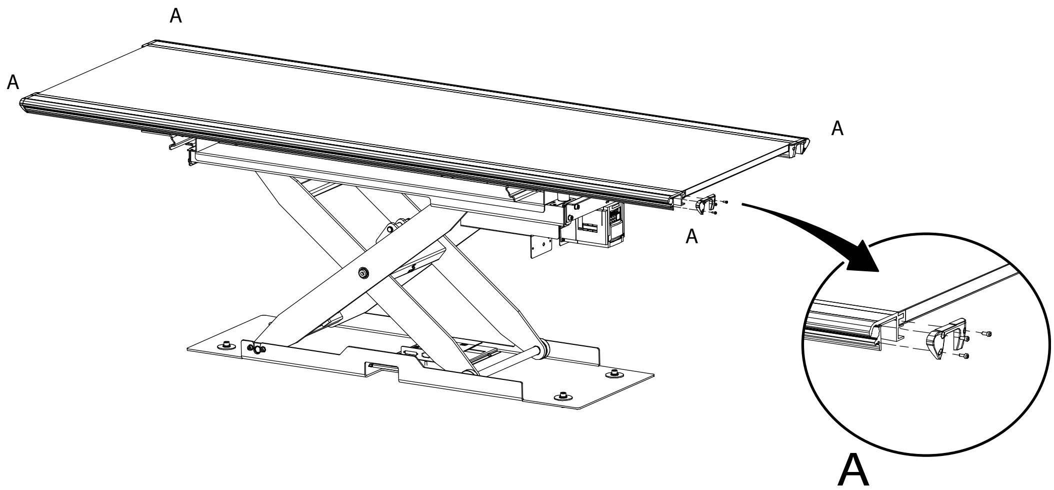


Fig. 4-126 End covers (A)

3. Place the table top in position.
   Fit the rack rail on the side of the table top with the same side as the pinion at the table.
4. Lift the table top onto the table frame. Roll the table top in position on the wheels.

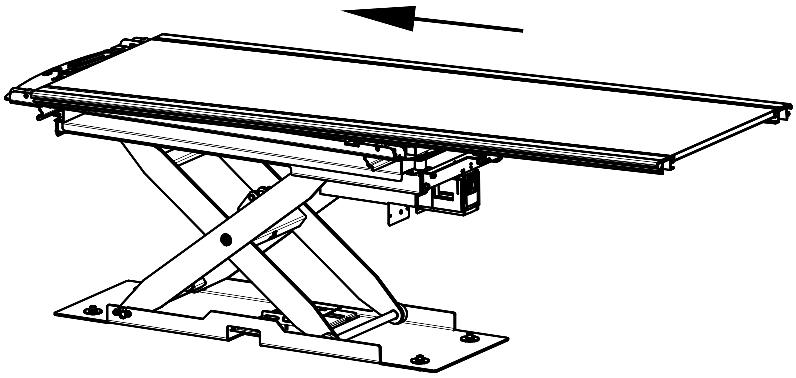


Fig. 4-127 Slide on the wheels to one side

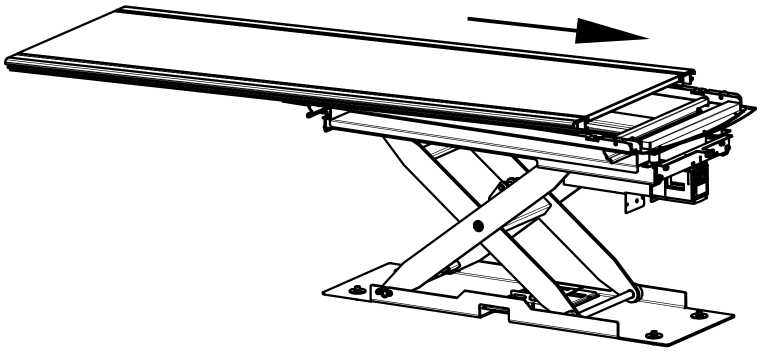


Fig. 4-128 Slide to the other side

5. Install the mechanical end stops.

WARNING!

The end stops must be correctly installed.

6. Install the four end covers.
7. Check that the table top runs smoothly.
8. Check the function of the table top brake.

4.27.2 Two Column Table (Option)

Note!

Be aware of the difference between the two rails (A) and (B).

Note!

When sliding the table top in place, make sure the friction pads of table top brakes aren't damaged.

1. Remove one of the table top end stops.
2. Switch on the power to the table and release the X/Y brake.
3. Press the brake pad against the magnets. Keep the brakes released (button pressed) when carefully sliding the table top in place.
   Rail (B) has to be installed on the front.
4. Install the mechanical stop (A), use Loctite 243. Tighten the bolts with 24 Nm.
5. Check that the table top runs smoothly.
6. Check the function of the table top brake.

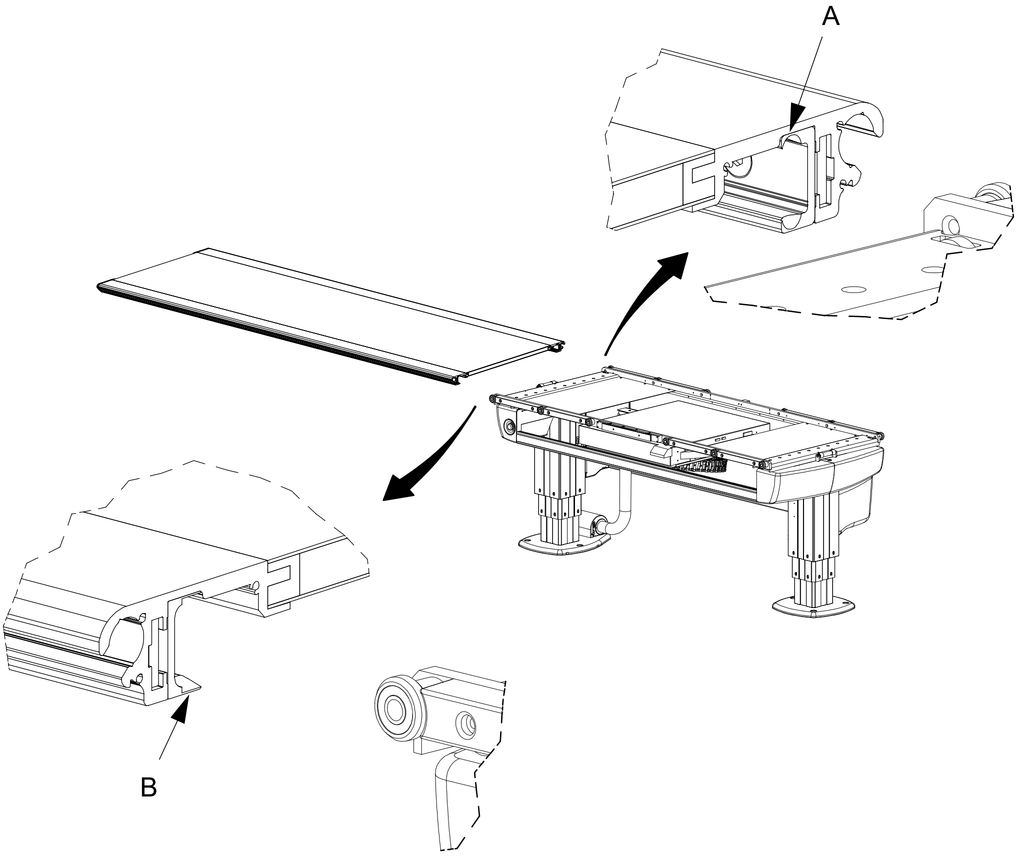


Fig. 4-129

4.28 Installation of Foot Control

4.28.1 Closed Table

1. Connect the foot control.
   The contact should have the reference point 2.1J05.
2. Position the foot control so it cannot be activated accidentally.

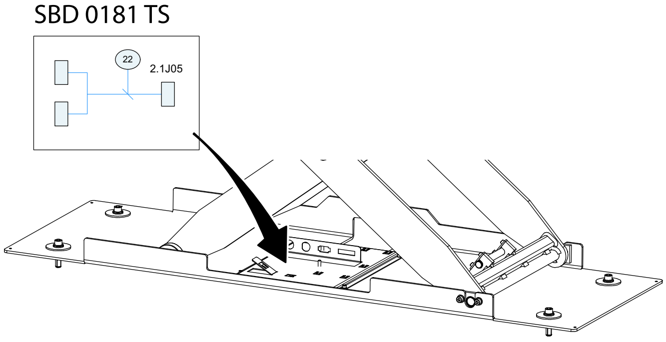


Fig. 4-130 Foot pedal attachment

4.28.2 Installation of Foot Control, Two column table (option)

Install the foot control and connect the cable 2.4J01 or 2.4J02 according to **Fig. 4-131**.

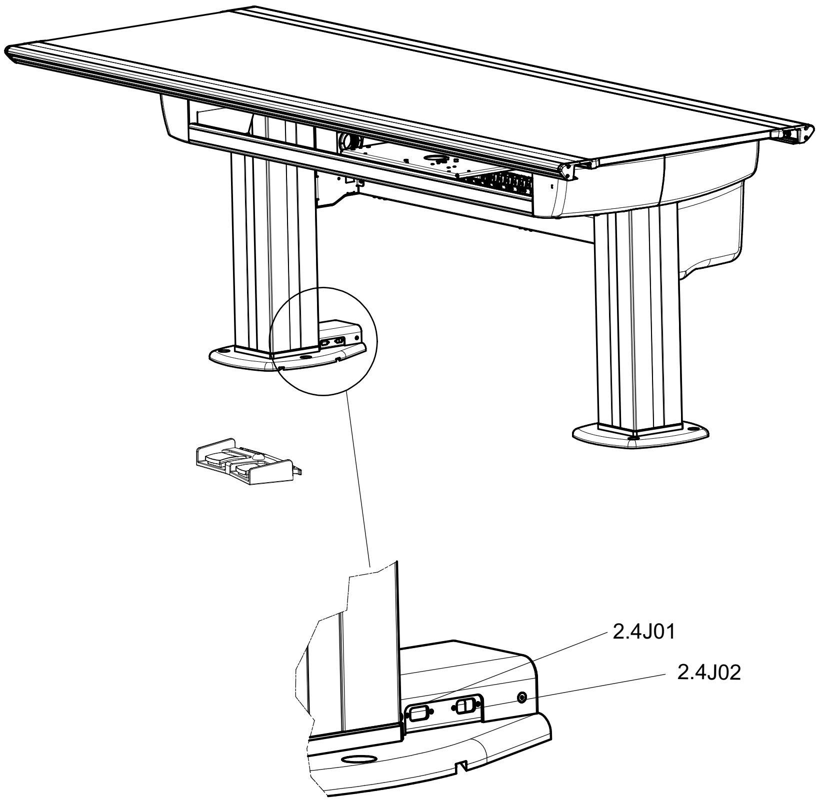


Fig. 4-131 Connect the foot control X/Y/Z or foot control X/Y separate (option)

4.29 Installation of Foot Control Strip Type, Two Column Table (option)

1. Install the foot control X/Y between the two columns.

   The foot control X/Y shall be placed against the foot plate or in a cable duct.

   Note!

   Open installation of the foot control X/Y cable is not allowed.

2. Place the cable from the foot control X/Y (A) in the track (C) underneath the foot plate.
3. Attach the foot control X/Y to the floor with double-sided tape.

   Note!

   The foot control X/Y is attached to the floor with double-sided tape, because of isolation between the floor and the foot control.

4. Cut the cable in suitable length and connect on contact 2.4J03 (B).

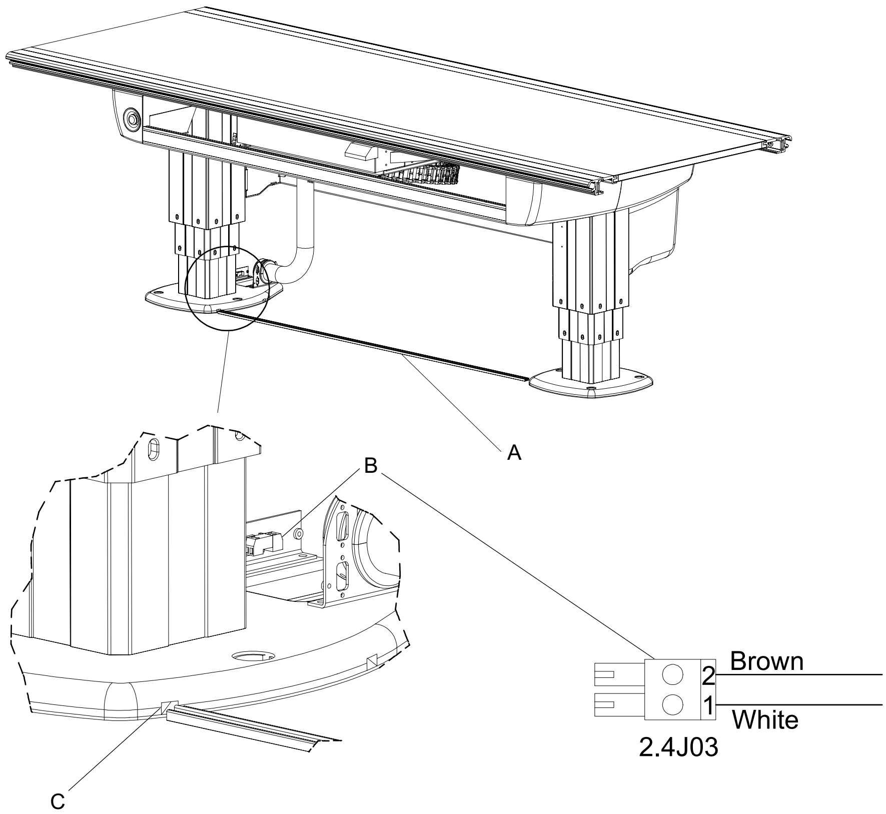


Fig. 4-132 Connect the foot control X/Y

4.30 Installation of Manoeuvre Hand Control, Closed Table

1. Connect the manoeuvre hand control.
2. The contact should have reference point 2.3J02 or 2.4J02.
   Use connection point 2.3J01 or 2.4J01 for the collimator hand control.

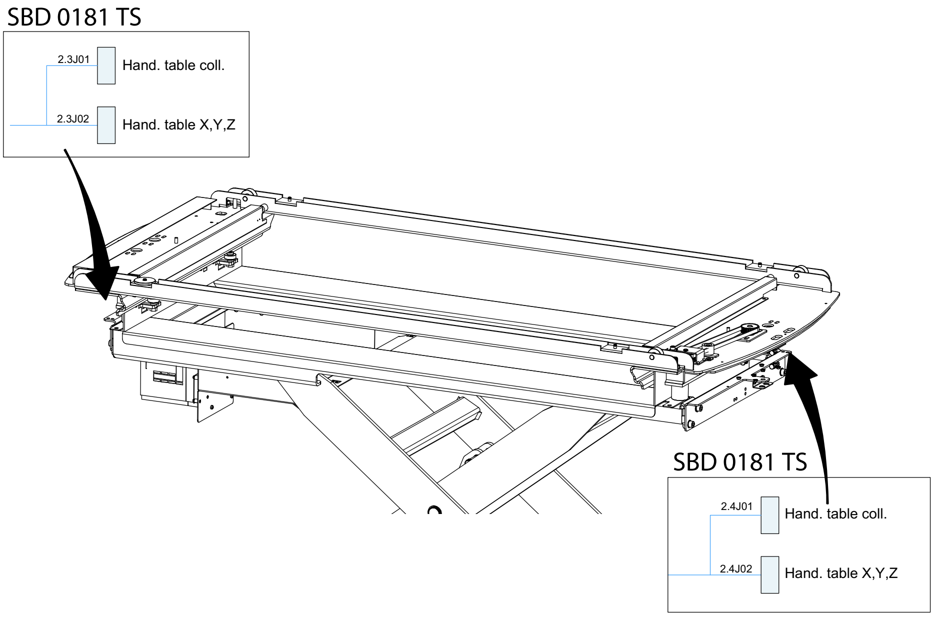


Fig. 4-133 Hand control attachment

4.31 Adjust Detector Holder, Closed Table

1. Adjust the detector holder by moving the index.

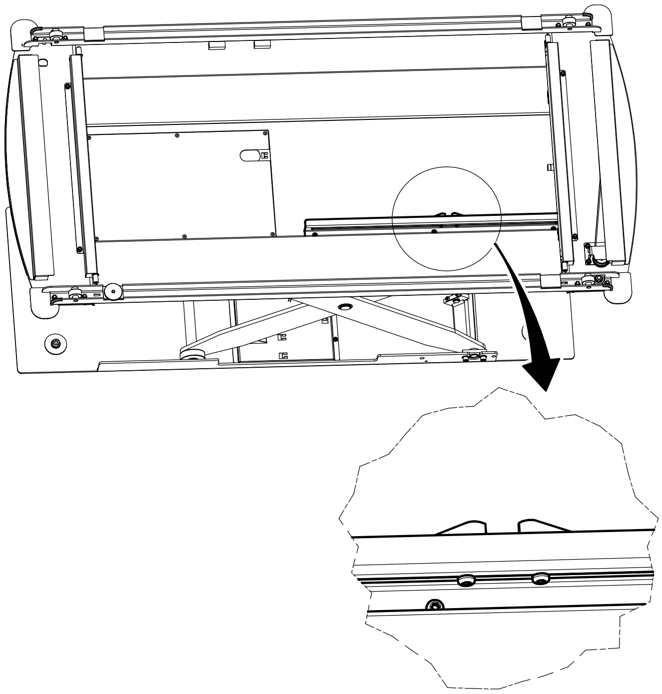


Fig. 4-134 Adjust detector holder

4.32 Reassemble Closed Table Covers

WARNING!

Squeezing hazard can occur between the vertical lift segments when moving in Z-direction.

CAUTION!

Connect the emergency stop cables in accordance with the markings.

1. Reassemble all the covers, see **Remove Top Covers, Page 160**.
2. Remember to assemble the lists between the lower covers.

4.33 Electrical Installation of Image System PC

CAUTION!

The image system PC should only have the image system software installed.

Other software installations could interfere with system operation.

Note!

The cables must be installed covered.

They shall not be placed on the floor.

Position the image system PC in the operation room.

Connect the cables between the image system PC and the system cabinet.

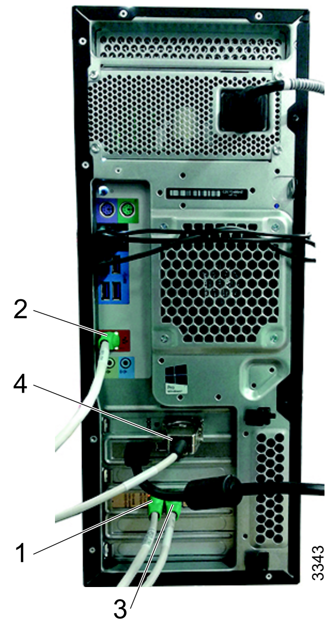


Fig. 4-135 Connections image system PC

1. Cable 5.0ETHCB800 – 5.0PC01-ETH1
2. Cable 5.0ETHIS – 5.0PC01-ETH2
3. Cable 5.0ETHHospital – 5.0PC01-ETH3
4. Cable 5.0RS232IS – 5.0PC01-I/0

4.33.1 Hospital Network

Connect cable 5.0ETHHospital to the Hospital ETH network.

4.33.2 Connections to System Cabinet

Wiring shall be made according to path 3 in **Table 4-3**.

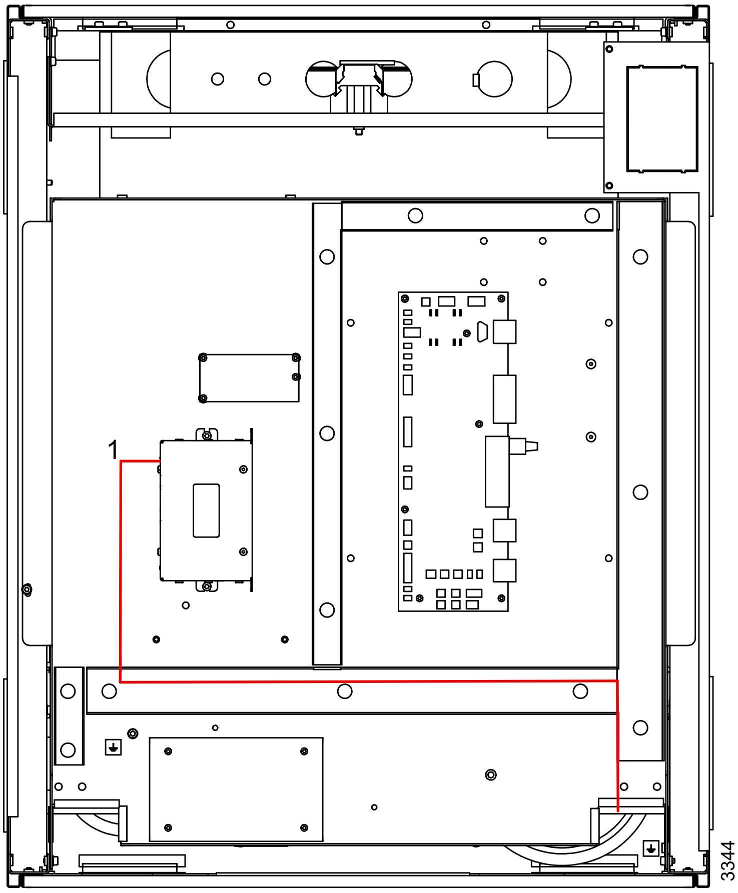


Fig. 4-136 Electrical plate 4.4 with CB800

1. *Cable 5.0ETHCB800 – 4.4CB800_01–J1*

Wiring shall be made according to path 1 in **Table 4-3**.

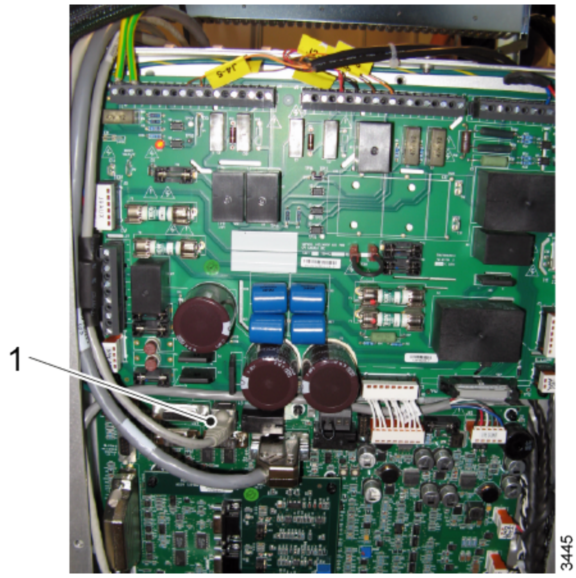
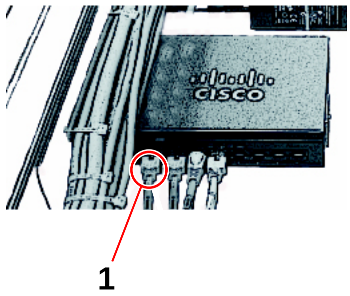


Fig. 4-137

1. *Cable 5.0RS232IS – 4.GEN–J3*

Wiring shall be made according to path 4 in **Table 4-3**.

Cable 5.0ETHIS	4.5HUB01–1	

4.34 Alignment, Calibration and Adjustment

4.34.1 Detector Calibration

For detector calibration, refer to manufacturer's detector manual.

4.34.2 Collimator Light and X-Ray Field Alignment

1. Align the tube with the detector.
2. Attach some suitable objects on the image receptor holder cover. Position the objects within the active image receptor area, nearby the edges.
3. Perform an exposure and evaluate the alignment (images vs. the collimator light field) using the references applied in the previous step.
4. The maximum deviation between light field and X-ray field is ±1% of SID.

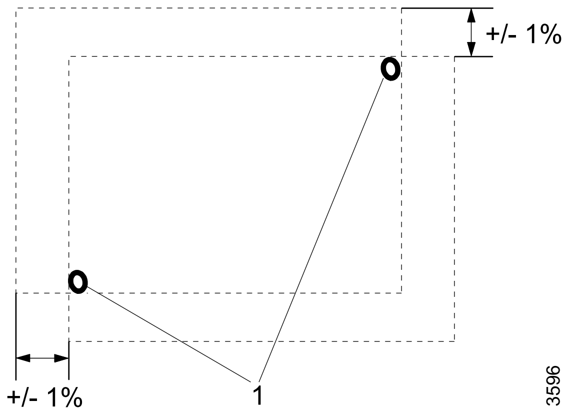


Fig. 4-138 Collimator light and X-ray field alignment

1. *Suitable objects for alignment of light and X-ray field*

4.35 Adjustment of the Collimator Light Field

4.35.1 Manual Collimator

4.35.1.1 Remove Cover

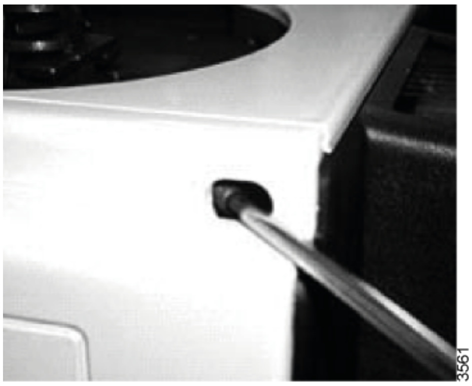


Fig. 4-139

1. Tighten the four Allen screws to allow removal of the cover.

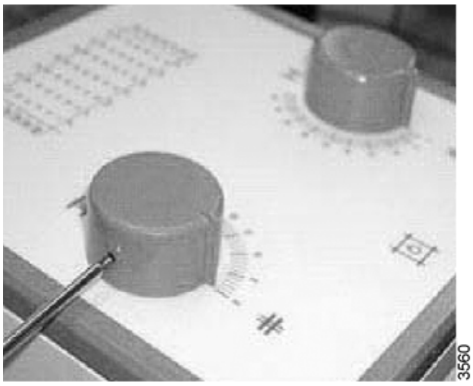


Fig. 4-140

2. Remove the two knobs.

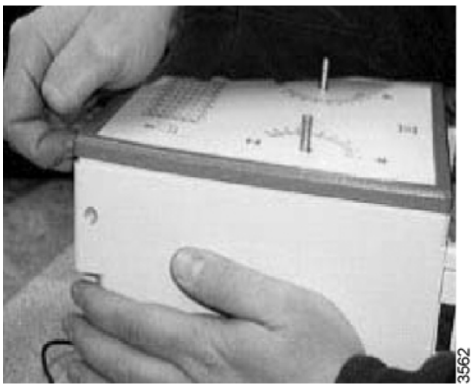


Fig. 4-141

3. Carefully remove the snap-on front panel.

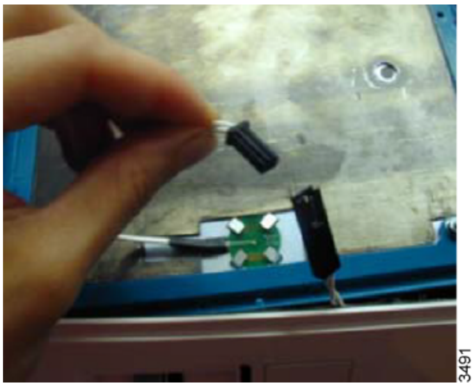


Fig. 4-142

4. Disconnect the connector.

Fig. 4-143

5. Remove the tape stop by lifting it off with a screw driver.

   Gently ease the tape into its container within the collimator.

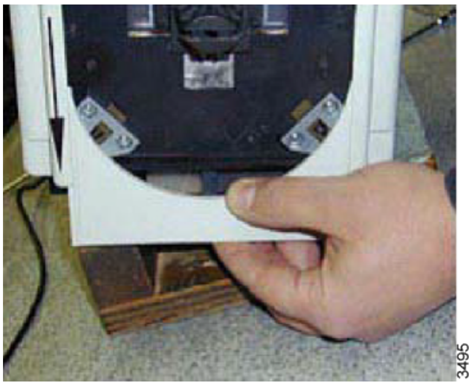
Fig. 4-144

6. Turn the collimator over and unscrew the four screws.

3564

Fig. 4-145

7. Remove the rear cover by unscrewing the screws.

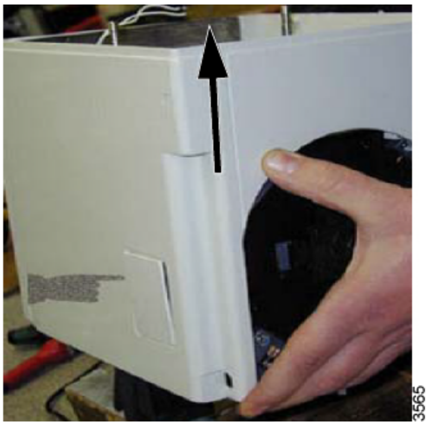


3495

Fig. 4-146

8. Place the collimator lower side down and slightly raise.

   Slip the semi-circle out.



3565

Fig. 4-147

9. Ease the cover upwards gently. This will also release the small panel.

Access to Collimator Components

Fig. 4-148

1. Laser

   Access to the laser by removing the two knobs and/or the front panel depending on the collimator model.

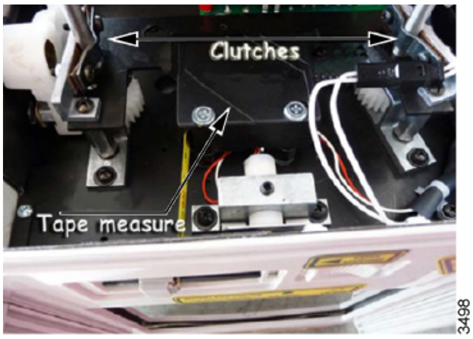


Fig. 4-149

2. Friction

   Access the clutches by removing the two knobs and/or the front panel depending on the collimator model.

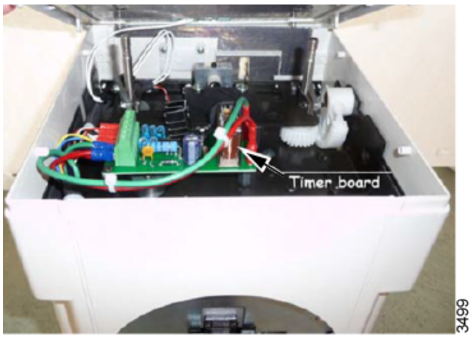


Fig. 4-150

3. Timer board

   Access the timer board by removing the two knobs and/or the front panel depending on the collimator model.

Fig. 4-151

4. Power supply

   Access the collimator power supply by removing collimator back panel.

Fig. 4-152

5. Transversal movement

   Access the transversal adjustment parts by removing the lateral plate.

4.35.1.2 Adjustment of Light Field Size

Longitudinal Calibration (LONG)

1. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
2. Remove the light source protection heatsink by unscrewing the fixing screws .
   This allows you to access the light source.
3. If the light-field needs to be moved laterally, loosen (not remove) the fixing screws A.
4. Adjust through screw B.
5. When calibration is terminated, lock the screws A.

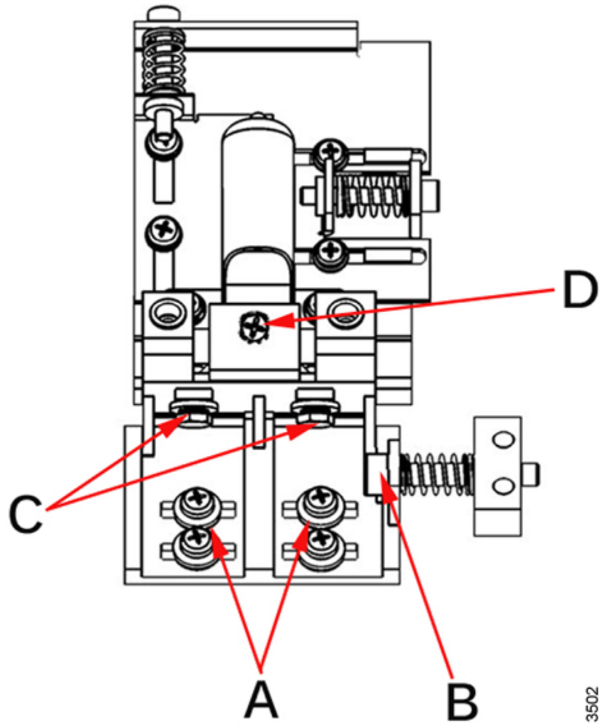


Fig. 4-153 Light field adjustment

Vertical Alignment

1. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
2. If adjustment is required loosen the two screws C holding the light support, see **Fig. 4-153**.
3. If the light-field is smaller than the X-ray field, lower the light source by adjusting screw D.
4. If the light-field is bigger than the X-ray field, raise the light source by adjusting screws D.
5. Tighten the two screws C.

4.35.1.3 Adjustment of Light Field – Radiation Field

If the light-field needs calibration, the mirror needs to be adjusted.

1. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
2. Loosen the mirror fixing screw A (not remove) and shift it to adjust the position of the mirror.

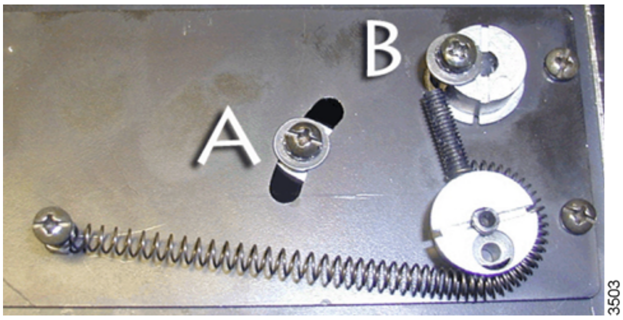


Fig. 4-154

3. Tighten the screw A and remount the cover.

4.35.1.4 Adjustment of Crosshairs

1. Activate the light field.
2. Adjust the light field to a narrow line for each pair of shutters by turning the two knobs alternately.
3. Check that the project cross line is exact halfway between the edges of the shutters.

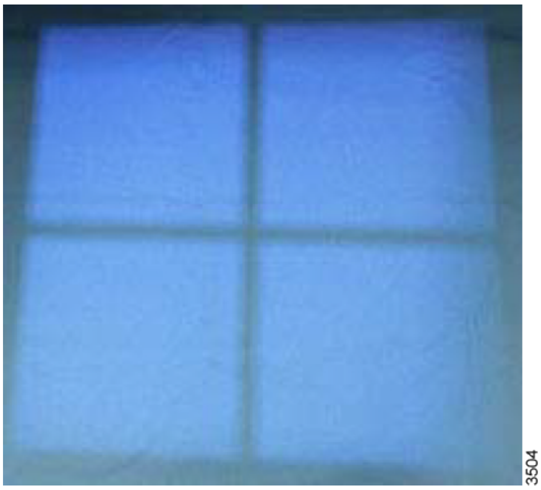


Fig. 4-155

4. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
5. Loosen the four screws securing the plastic panel and adjust the cross lines to coincide with the light lines.
6. Tighten the screws.

4.35.1.5 Adjustment of Line Laser

WARNING!

Class II laser system.

Do not stare into the beam.

Class II laser beam < 1 m W - wavelength = 645 nm.

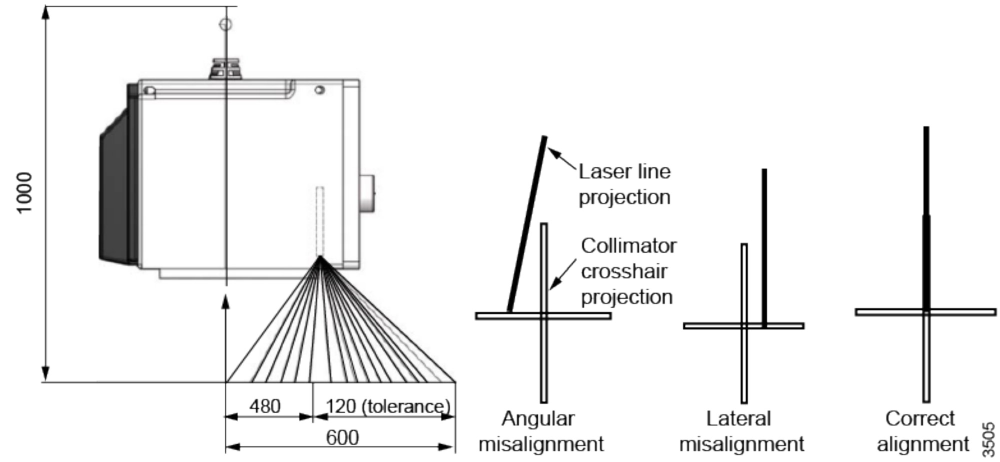


Fig. 4-156

1. Activate the light-field.
2. Turn the control knobs and adjust the light to a narrow line for each pair of shutters.
   Check that the laser line is projected on the light field and that it is midway from the edges.
3. To adjust, remove the collimator cover, see **4.35.1.1 Remove Cover, Page 221**.
4. Rotate the laser or tilt the laser support if possible.
5. To rotate the laser, loosen the screw A the laser support.
6. To move the laser support, loosen the screws B.

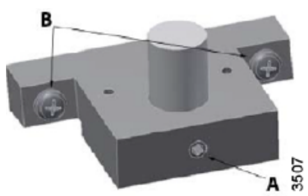


Fig. 4-157

7. When calibration is finished, tighten the screws.

WARNING!

Do not apply excessive force to the screws.

The laser shell is plastic and excessive pressure could crack the plastic and possibly short-circuit the laser.

4.35.2 Automatic Collimator

4.35.2.1 Adjustment of Light Field – Radiation Field

If the coincidence of the light field and the radiation field is not adequate (e.g. tolerances of the focus point), the light field can be centered using the two Allen screws (2), (3) on the top of the collimator.

Note!

The slot-head screw (1) next to the two adjustment screws may not be loosened under any circumstances!

Fig. 4-158

1. Adjustment in the x-direction (height): If the screw (2) is turned clockwise, the light field moves to the right and vice versa.
2. Adjustment in the y-direction (width): If the screw (3) is turned clockwise, the light field moves to the back and vice versa. The adjustment range in this direction is about three times larger than the range in the x-direction.
3. The maximum adjustment range is approximately ±5 mm (with SID 115 cm).

   Note!

   The adjustment screws may only be turned until the resistance of the compression springs can be felt. The screws must not be loose!

4. After adjusting the light field, the crosshairs window can be readjusted by loosening the 4 fastening screws of the holding frame and the line laser if needed.

   Note!

   The adjustment of the light field may have an effect on the adjustment of the system. If necessary, it must be readjusted, too.

4.35.2.2 Adjustment of Light Field Size

Halogen Lamp

In order to change the size of the light field, remove the lamp cover and the heat shield first.

CAUTION!

Risk of burns!

If the halogen lamp of the light localizer burns for a long time, the lamp housing can heat up.

Avoid contact with lamp housing to prevent burns.

CAUTION!

The maximum permissible operation time duty cycle is 50% (90 seconds on to 90 seconds off).

The permanent on time of the light must not exceed 10 minutes.

1. Use a 5.5 mm open-end wrench to loosen the clamping screw (1).
2. To enlarge the light field, turn the screw (2) clockwise.

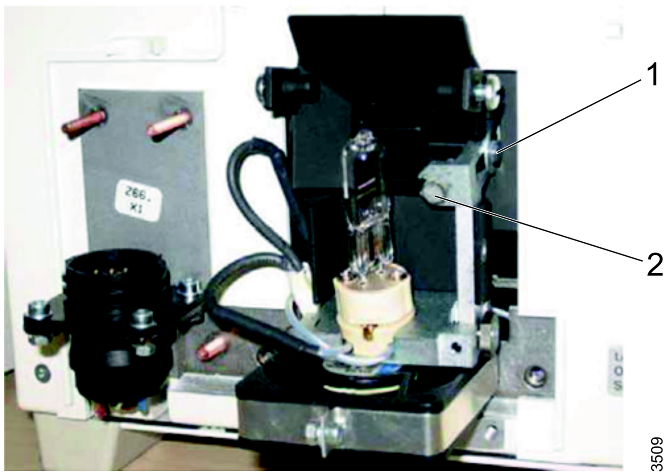


Fig. 4-159

3. To reduce the size of the light field, turn the screw (2) counterclockwise.
4. After adjusting the size of the light field, tighten the clamping screw (1) again.

LED

In order to adjust the light field, it is necessary to remove the lamp cover at first.

CAUTION!

Risk of burns!

If the LED of the light localizer burns for a long time, the heatsink can heat up.

Avoid contact with heatsink to prevent burns.

CAUTION!

Risk of eye injury!

Photobiological effect of ultraviolet radiation.

Do not look into the light beam for longer than 15 seconds.

Always keep enough distance to the collimator.

1. Use a 5.5 mm open-end wrench to loosen the clamping screw (1).
2. To enlarge the light field, push the heatsink (2) towards the housing.

Fig. 4-160

3. To reduce the size of the light field, pull out the heat sink (2).
4. Tighten the clamping screw (1) again.

4.35.2.3 Adjustment of Crosshairs

The crosshairs (1) of the collimator can be adjusted after loosening the 4 fastening screws of the holding frame (2).

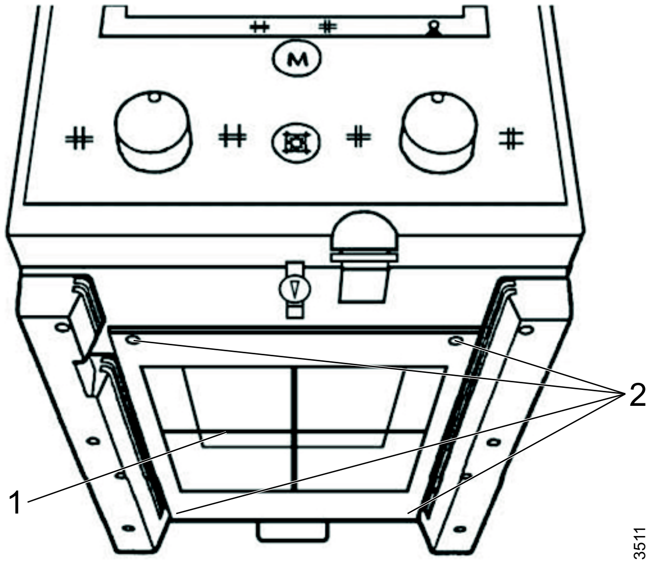


Fig. 4-161

4.35.2.4 Adjustment of Line Laser

1. Loosen the screws (1) and (2) to get the line laser (4) centered again.
2. The laser holder may now be turned around the axis of the screw (2).
3. To realign the laser line coaxial to the crosshairs, the screw (3) has be loosened so the laser (4) can be rotated around its axis in the holder.

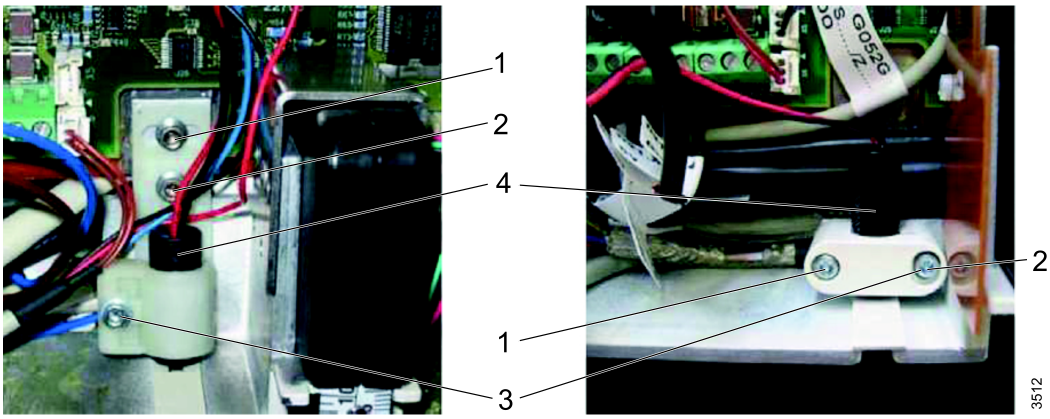


Fig. 4-162

4.35.3 Stitching Collimator

4.35.3.1 Remove Cover

Fig. 4-163

1. Remove the two knobs.

Fig. 4-164

2. Carefully remove the snap-on front panel.

Fig. 4-165

3. Disconnect the connector.

Fig. 4-166

4. Remove the tape stop by lifting it off with a screw driver.

   Gently ease the tape into its container within the collimator.

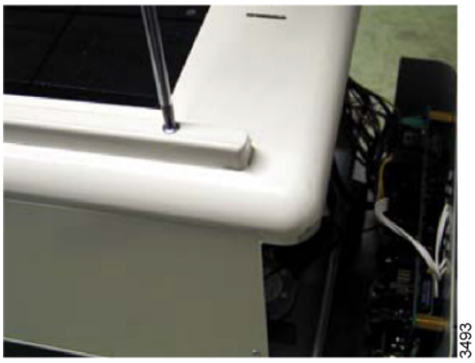


Fig. 4-167

5. Turn the collimator over and unscrew the four screws.

6. Remove the rear cover by unscrewing the screws.

Fig. 4-168

7. Remove the lateral cover by lifting it off from the two spacers.

4.35.3.2 Adjustment of Light Field Size

Vertical Alignment

1. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
2. If adjustment is required loosen the two screws C holding the light support.
3. If the light-field is smaller than the X-ray field, move away the light source by adjusting screw D.
4. If the light-field is bigger than the X-ray field, move the light source closer by adjusting screws D.
5. Tighten the two screws C.

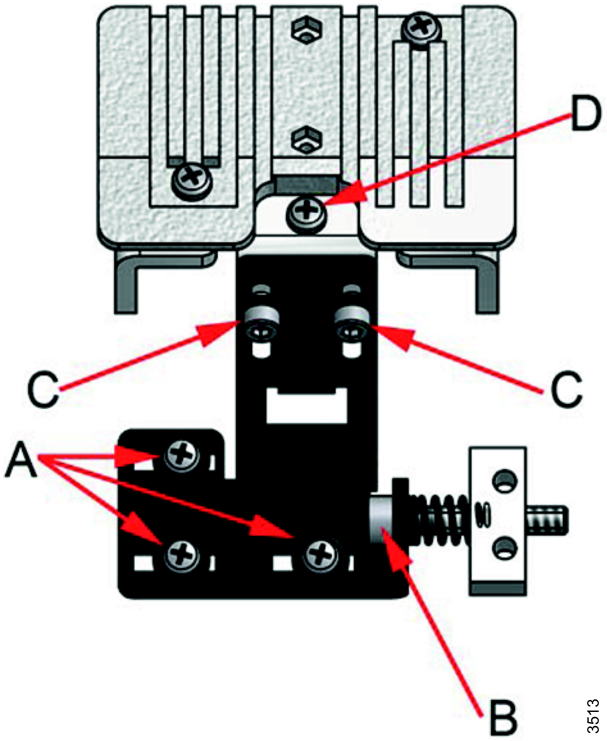


Fig. 4-169

Longitudinal Alignment (Long)

CAUTION!

Risk of burns!

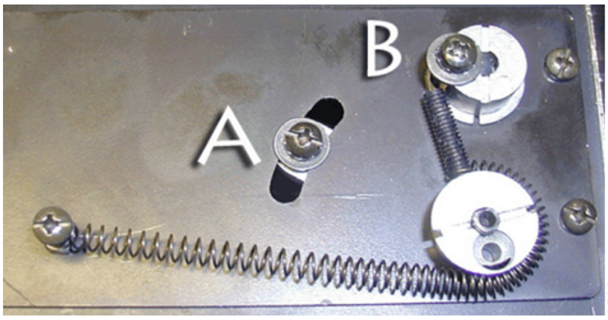
Do not touch the dissipater with your hands; it could be hot and cause severe burns.

1. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
2. If the light-field needs to be moved laterally, loosen (not remove) the fixing screws A, see **Fig. 4-169**.
3. Use screw B to adjust transversely.
4. When calibration is terminated, lock the screws A.

4.35.3.3 Adjustment of Light Field – Radiation Field

If the light-field needs calibration, the mirror needs to be adjusted.

1. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
2. Loosen the mirror fixing screw A (not remove) and rotate the cam B to adjust the position of the mirror.



3503

Fig. 4-170

3. Tighten the screw A and remount the cover.

4.35.3.4 Adjustment of Crosshairs

1. Activate the light field.
2. Adjust the light field to a narrow line for each pair of shutters by turning the two knobs alternately.
3. Check that the project cross line is exact halfway between the edges of the shutters.

3504

Fig. 4-171

4. Remove the part of the cover necessary to access the screws, see **4.35.1.1 Remove Cover, Page 221**.
5. Loosen the four screws securing the plastic panel and adjust the cross lines to coincide with the light lines.
6. Tighten the screws.

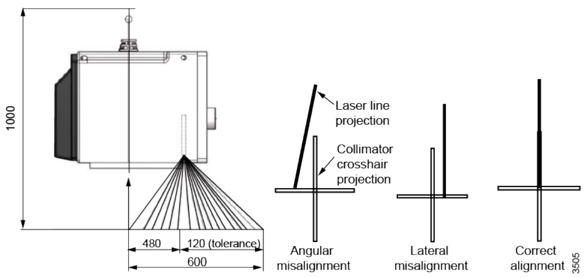
4.35.3.5 Adjustment of Line Laser

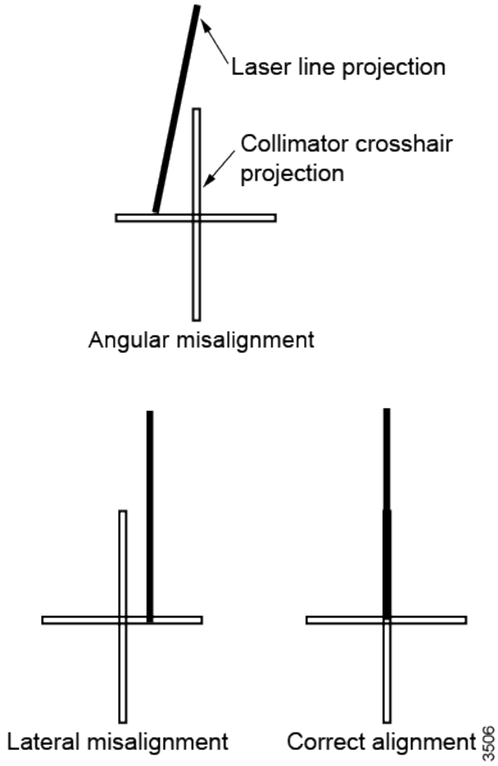
WARNING!

Class II laser system.

Do not stare into the beam.

Class II laser beam < 1 m W - wavelength = 645 nm ± 10 nm.





1. Remove part of the cover to access the point of adjustment, see **4.35.1.1 Remove Cover, Page 221**.
2. The line is to fall on a perpendicular cross-line on the plastic anti-dust panel near the collimator controls.
3. Adjust the position of the line by rotating or moving the base of the laser system.
4. To rotate the laser, loosen the Allen screw A.

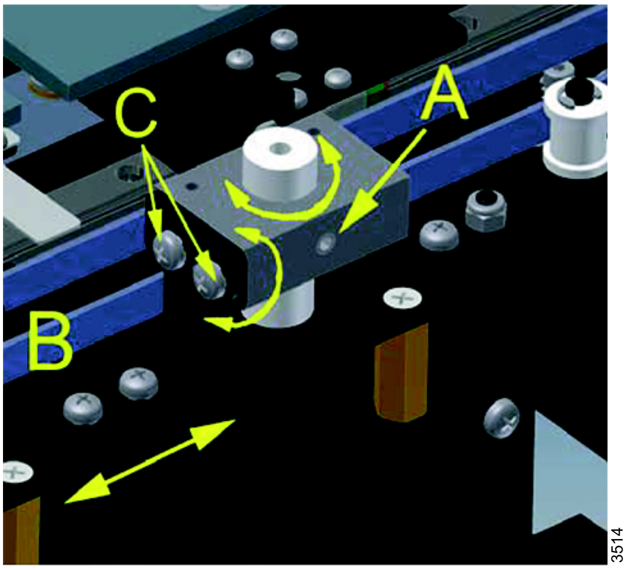


Fig. 4-172

5. Tighten the Allen screw when the laser beam falls on or is parallel to the bisector line drawn on the antidust panel.
6. To tilt the laser system, loosen the 2 screws C placed on the laser support and shift it upwards or downwards.
7. Once the position of the laser line has been adjusted, tighten the 2 screws C.
8. Shift the laser system by loosening the two B screws holding the laser system base to the beam limiting device front plate.
9. Move the base until the laser beam falls over the perpendicular bisector line on the anti-dust panel.
10. Tighten the two B screws.

WARNING!

Do not apply excessive force to the screws.

The laser shell is plastic and excessive pressure could crack the plastic and possibly short-circuit the laser.

4.36 Check the Emergency Stops

Check the function of the emergency stops, see **2.11**.

4.37 Install Positioning Index (option)

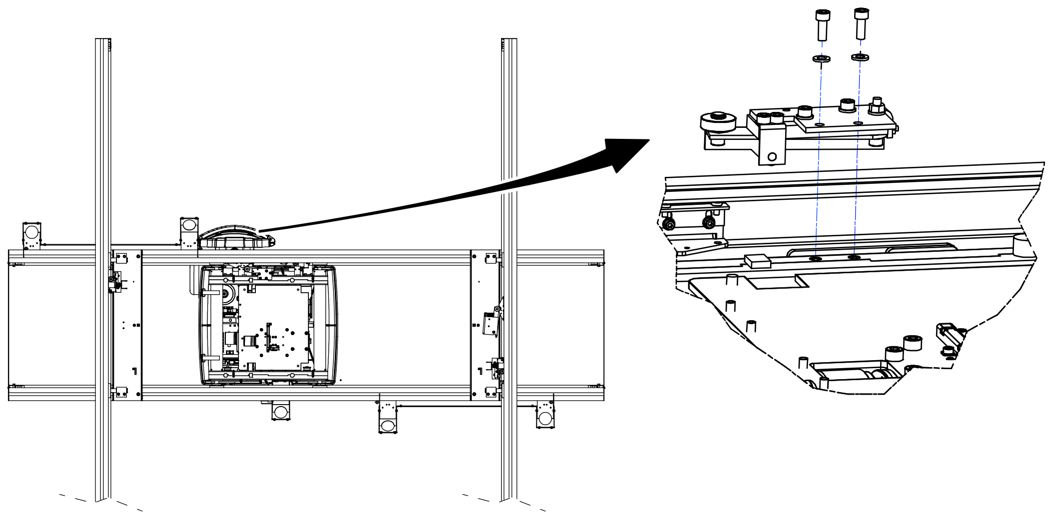


Fig. 4-173 Position index, table

The positioning index is intended for easily positioning of the OTC in the center of the detector, over the table, see **Fig. 4-173**, and at the desired SID from the wallstand, see **Fig. 4-178** and **Fig. 4-179**.

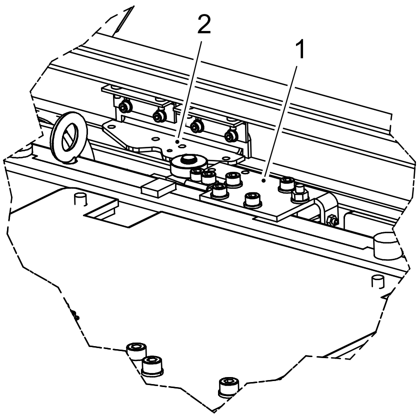


Fig. 4-174 Positioning index

1. Place the positioning index (2) in position next to the index positioning arm (1).

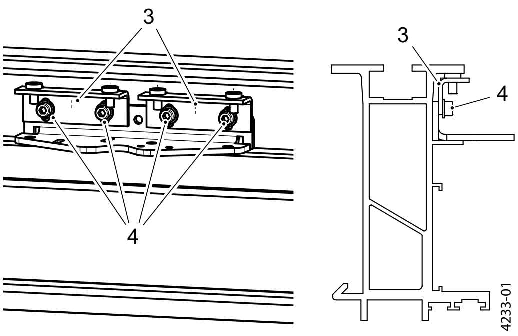


Fig. 4-175

2. Slide the index lock brackets (3) upward until it touches the profile.
3. Tighten the screws (4).

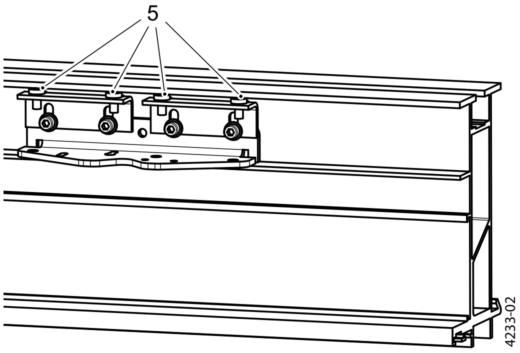


Fig. 4-176

4. Temporary tighten the set screws (5)
5. Check the position of the positioning index. Adjust if necessary.
6. Loosen the set screws (5), apply Loctite 243 and tighten the set screws again (5)

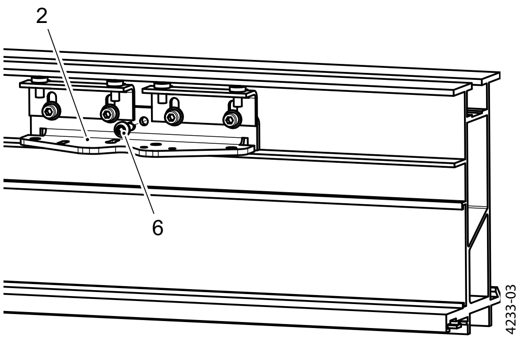


Fig. 4-177

7. Secure the positioning index (2) with the self-tapping screw (6).

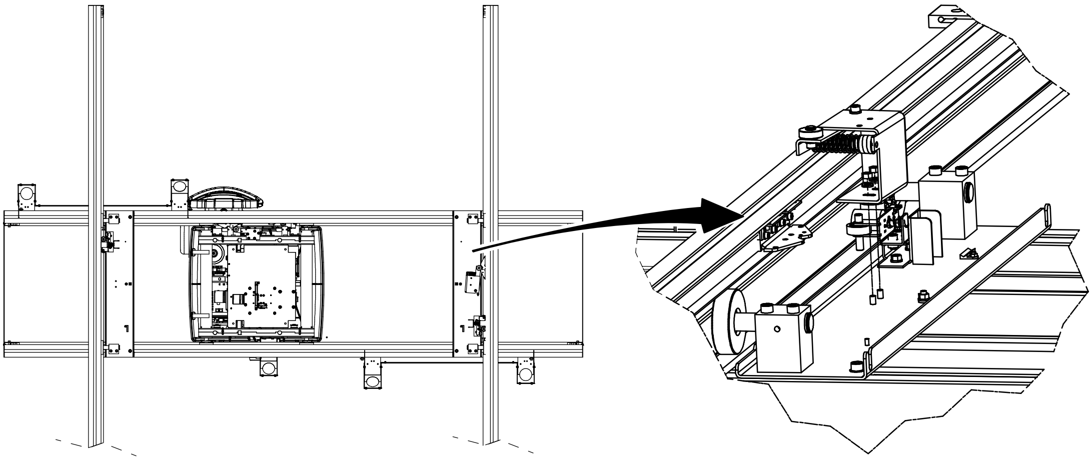


Fig. 4-178 Position index, wallstand

For mounting of positioning index for the wallstand see step **2.** – step **7.** on page **241** .

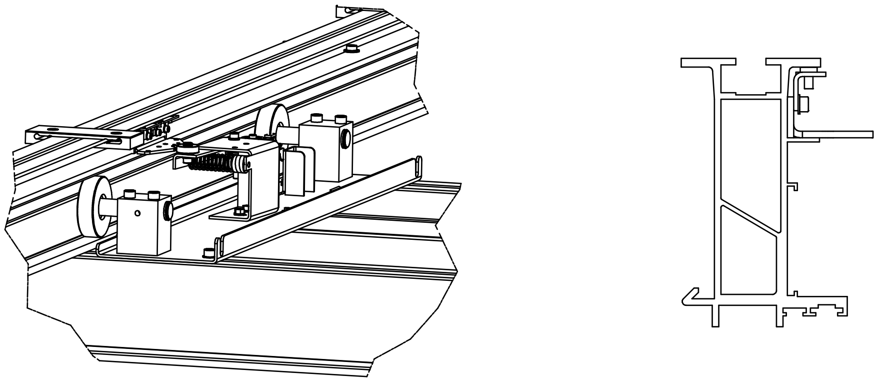


Fig. 4-179

To make it easier for the user to find the right SID from the wallstand, use the enclosed stickers. Consult with the user and install the index(-es) at the desired SID and mark with the stickers according to **Fig. 4-180**.

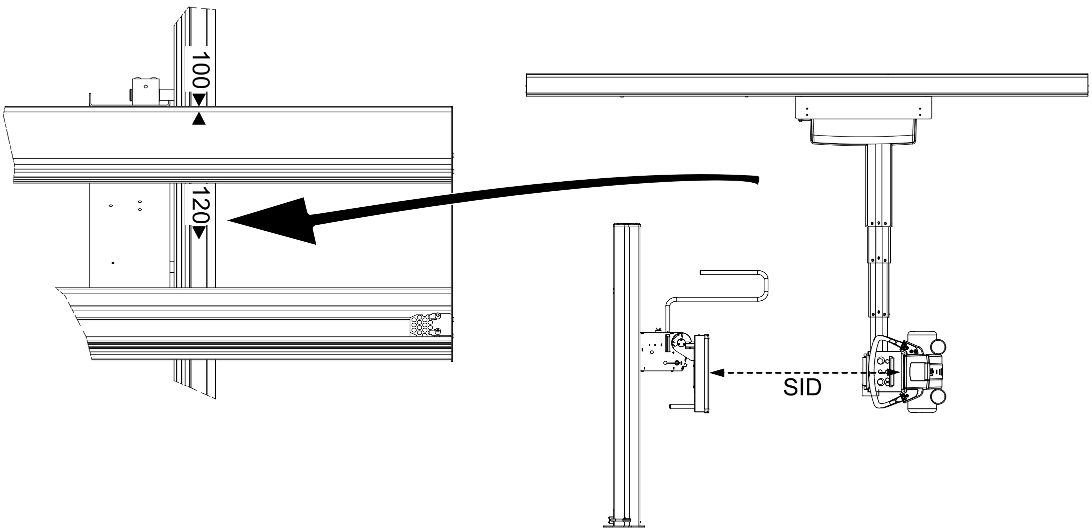


Fig. 4-180 Marking with stickers

4.37.1 Micro Switch (option)

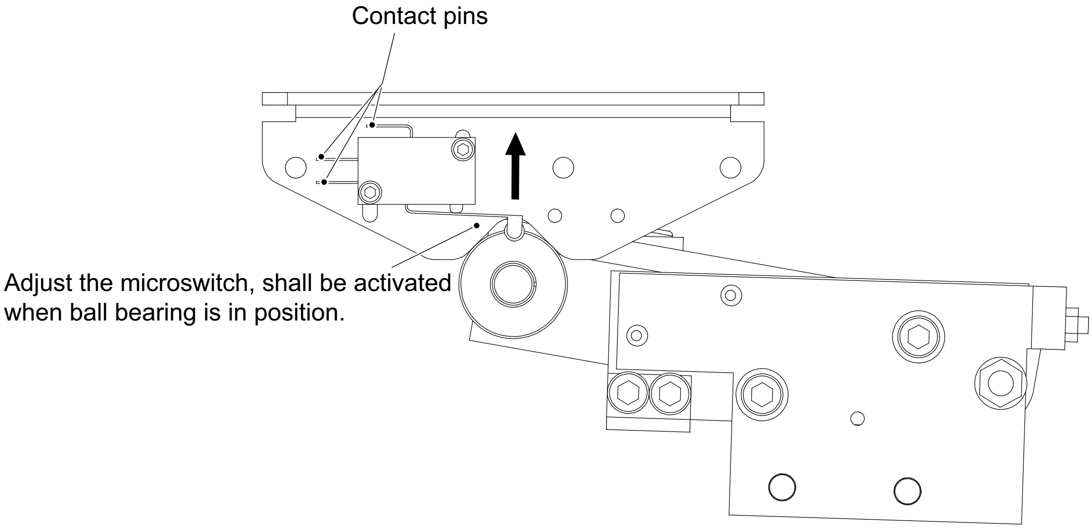


Fig. 4-181 Micro switch

Mount the micro switch in the arrow direction.

The micro switch contact pins must not touch moving parts during manual movement of the ceiling suspension in X/Y-directions.

4.37.2 Electrical Indexes (option)

Connect the electrical indexes according to **Fig. 4-182**.

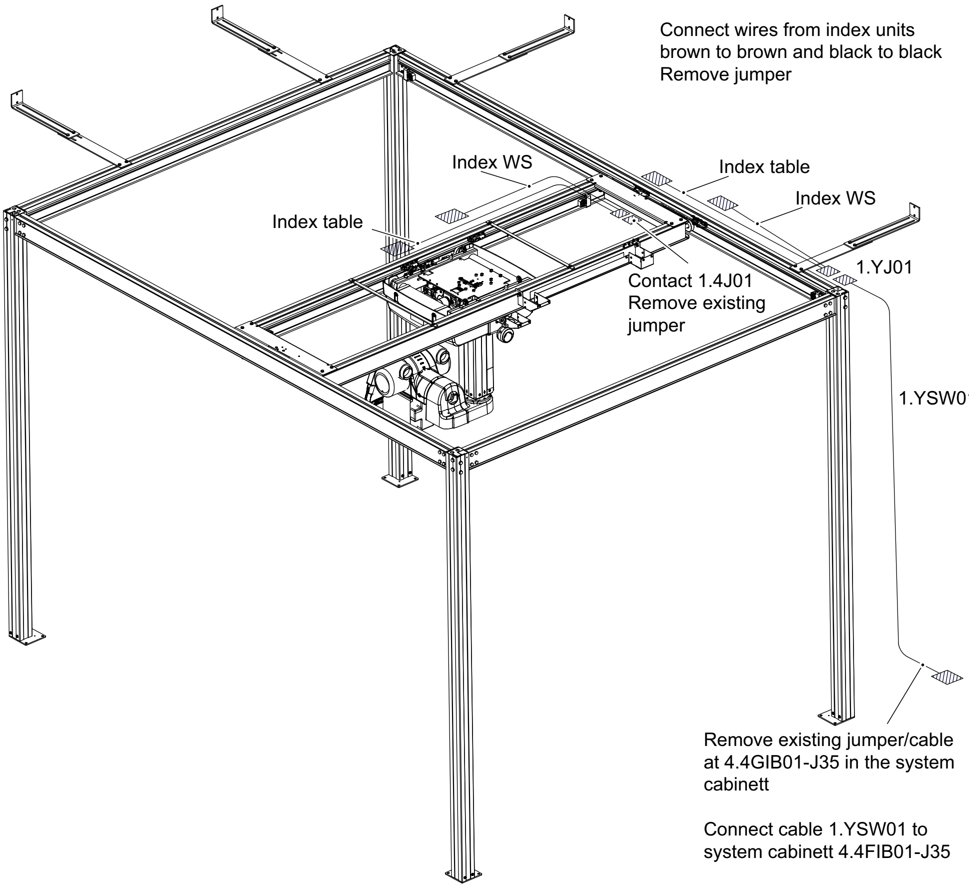


Fig. 4-182 Connecting electrical indexes

Check functionality of the electrical indexes.

X-ray exposure shall be inhibited when ceiling suspension is placed outside the index positions.

4.38 Calibration of Positioning System

Enter the service mode by pressing the service symbol in the left corner for 2 sec.

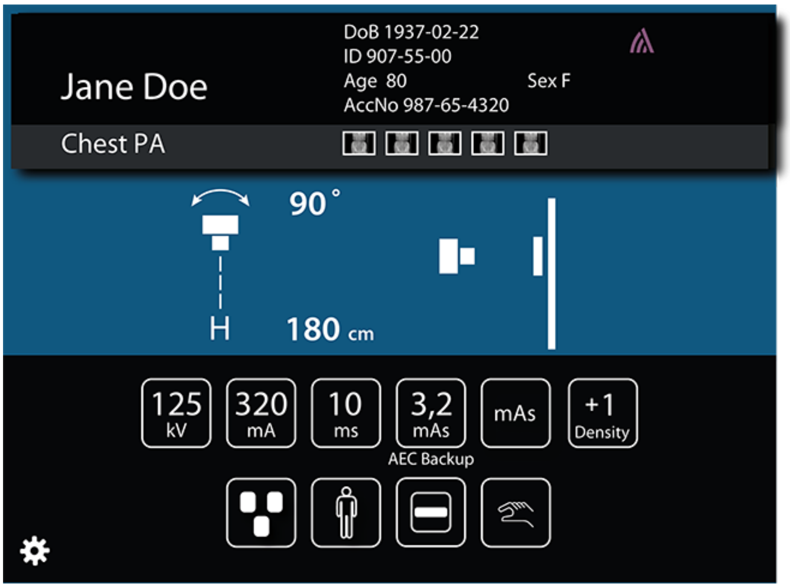


Fig. 4-183

Navigate to: *SERVICE/SETTINGS/KEYBOARD*.

Enter the service code 1895.

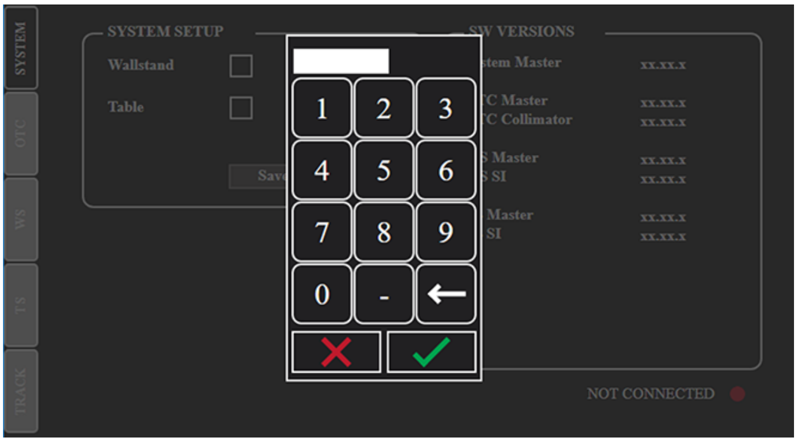


Fig. 4-184

At access, vertical folders are selectable for the full system.

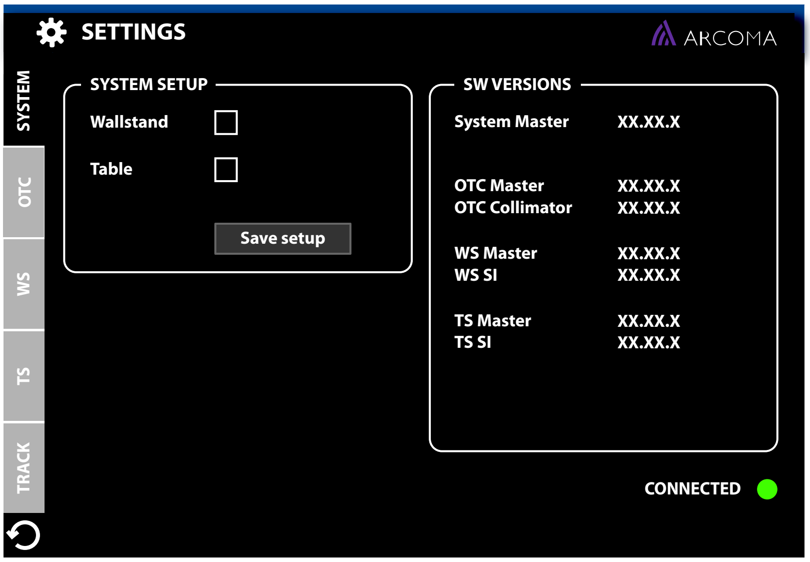


Fig. 4-185 Service tag selected

- *SYSTEM* - Always available.
- *OTC* - Always available.
- *WS* - Available when *WS* is selected in *SYSTEM* in the *SYSTEM SETUP*.
- *TS* - Available when *TS* is selected in *SYSTEM* in the *SYSTEM SETUP*.
- *TRACK* - Always available.

The activation of a button will result in:

 a green check box, beside the button, if the value/change is accepted/defined.

 a red cross, beside the button, if the value/change is not accepted/defined.

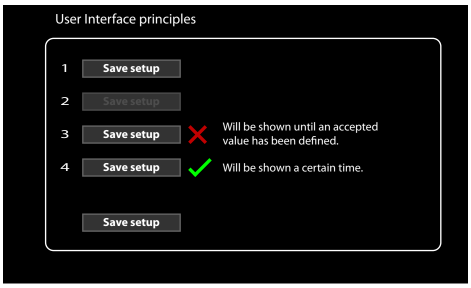


Fig. 4-186 Value/change is accepted or denied

Note!

Restart directly after calibration to save the calibrated values.

4.38.1 OTC Z-position

CAUTION!

When operating the column (Z-position) from the service program, software end stops are bypassed.

Take great care when driving close to the end stop positions to prevent collisions.

Note!

When recalibrating, perform all the steps below from 1 to 6.

1. Navigate to: *SERVICE/SETTINGS/OTC/Calibration/Z CALIBRATION*.

Fig. 4-187 OTC view

2. Measure the focal spot to floor distance, preferably using the measuring tape in the collimator.
3. Enter the height at the "*Calibration position*" box. The height shall be entered in mm.
4. Restart directly after calibration to save the calibrated values.

Note!

If it is a recalibration of the Z position, also perform the steps below.

5. Calibrate the Z high end stop, Z low end stop and Z safety zone.
6. Go to the *WS* resp. *TS* menus.

   Recalibrate entering the values at *TS position* resp. *WS position*, manual or motorized Z movement.

4.38.2 OTC Z High End Stop

Note!

The Z high end stop is calibrated from factory, only perform the calibration if necessary.

The correct position for setting the high end stop is approximately 20 mm below the mechanical end stop, which is placed in the column.

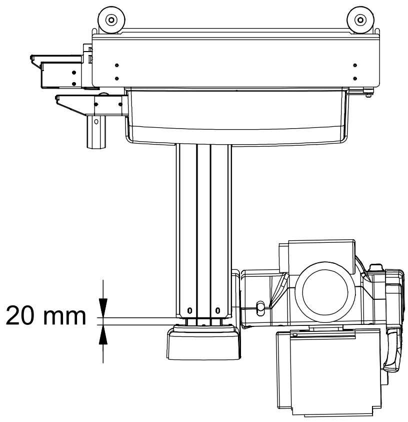


Fig. 4-188 High end stop

1. Navigate to: *SERVICE/SETTINGS/OTC/Calibration/End stops*.

Fig. 4-189 End stops

2. Select "*Clear values*". This enables to drive the OTC to any position.
3. Drive the OTC to the new desired position for the high end stop.

Procedure to define the high end stop:

When the OTC is in position, select "*Set high*" to define the new position for high end stop. The position for the low end stop will remain the same.

4. Restart directly after the calibration to save the calibrated values.

4.38.3 OTC Z Low End Stop

Note!

The Z low end stop is calibrated from factory, only perform the calibration if necessary.

To set the Z low end stop, use the same procedure as for setting the definition of the high end stop.

When the OTC is in position for the low end stop, select “*Set low*” to define the new position for low end stop. The position for the high end stop will remain the same.

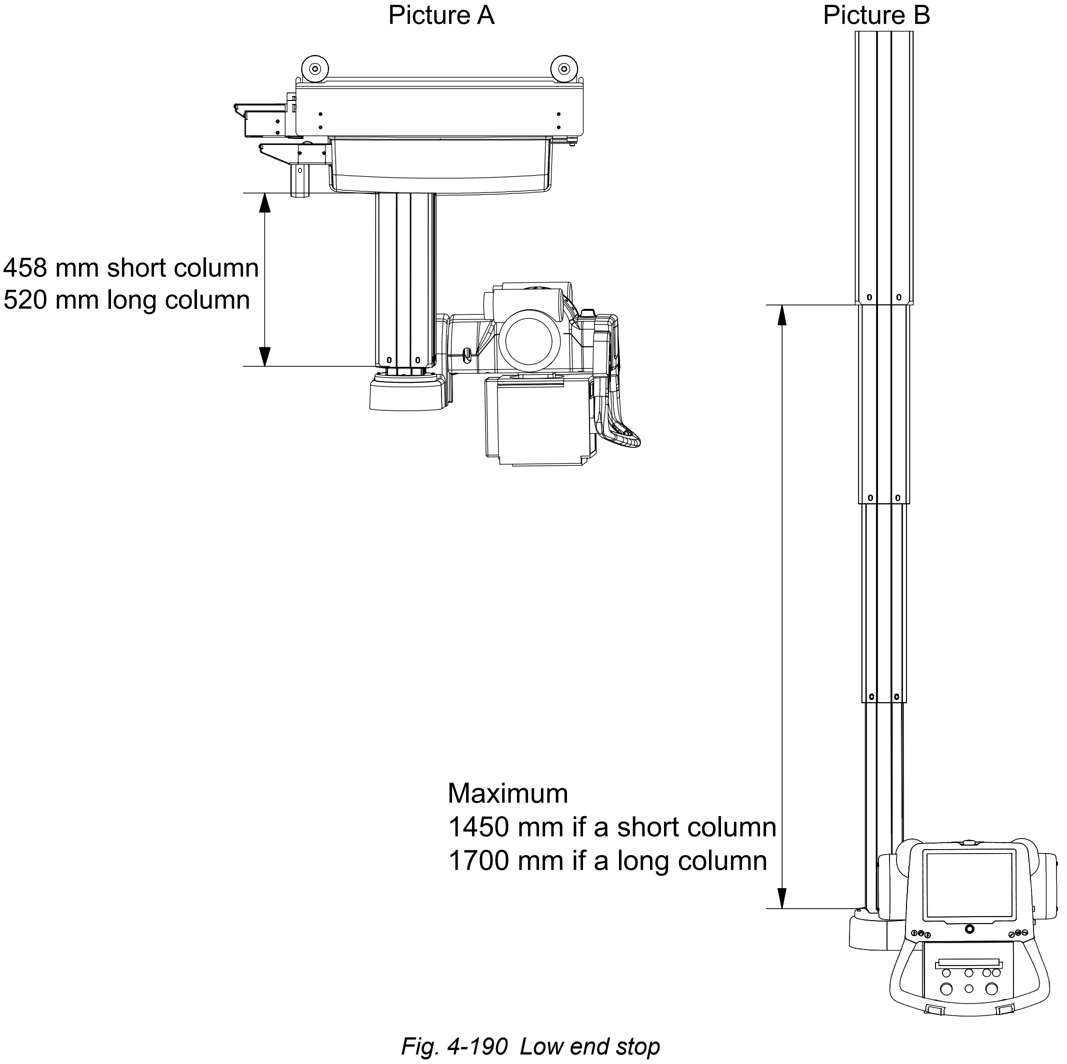


Fig. 4-190 Low end stop

4.38.4 OTC Z Safety Zone

The correct position for calibrating the mechanical part of the Z safety zone is at a height of 1240 mm from the floor to the lowest part of the OTC. The software safety zone is set at the same position (make sure that the safety arm is not affected when setting the software safety zone).

1. Navigate to: *SERVICE/SETTINGS/OTC/Calibration/SAFETY HEIGHT*.

Fig. 4-191 Safety height

2. Drive the column, by using the navigation buttons, until the lowest part of the OTC is 1240 mm from the floor. The tilting lever shall not lift off the switches according to the figure below. If it does, loosen the screws (C) and adjust the plates (D).

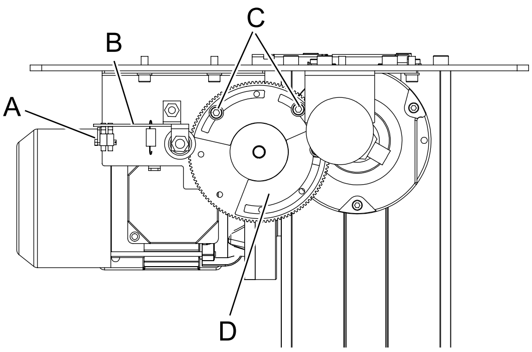


Fig. 4-192 Tilting lever

A Switch	*C Screws*
B Tilting lever	*D Plate*

3. Press the "*Save Safety height*" button to set the Z safety zone.
4. Drive the column downward as low as possible. The tilting lever shall lift off the switches. If not, adjust the plates.
5. Drive the column upward as high as possible. The tilting lever shall not lift off the switches, from 1240 mm and the whole way up. If it does, adjust the plates.
6. Restart directly after the calibration to save the calibrated values.

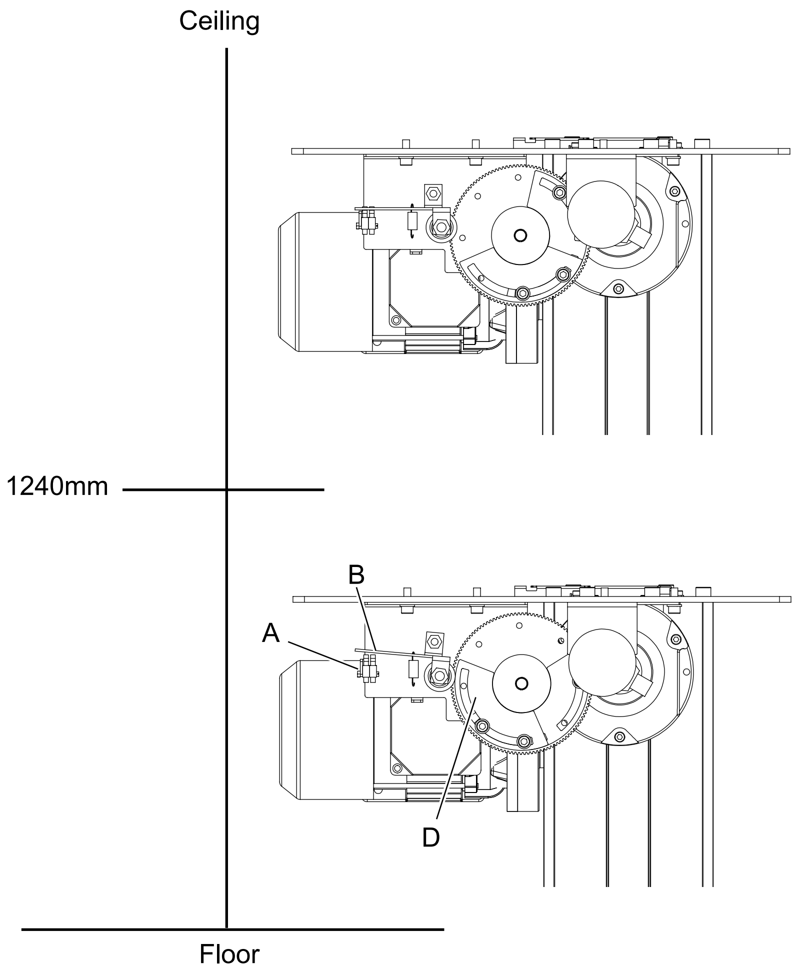


Fig. 4-193 Setting Z safety zone

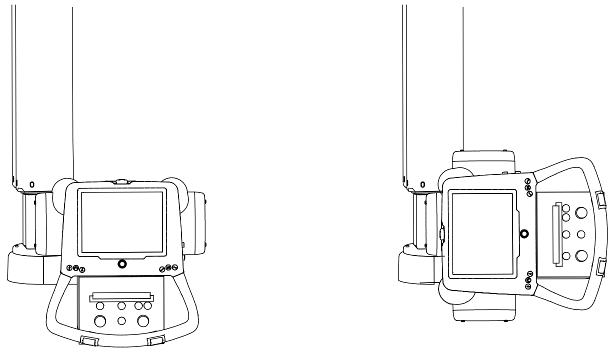
A Switch
B Tilting lever
C N/A
D Plate

4.38.5 OTC Alpha Calibration

Note!

The Alpha position is calibrated from factory, only perform the calibration if necessary.

The calibration of Alpha requires two positions. The first position is with the alpha in 0° and the second with alpha in –90°.



0 degrees -90 degrees

Fig. 4-194 Calibrating Alpha

Take the following actions:

1. Navigate to: *SERVICE/SETTINGS/OTC/Calibration/ALPHA CALIBRATION*.

Fig. 4-195 Alpha calibration view

2. Release the alpha brake and turn alpha to 0°.
3. Press the *Set 0°*- button.
4. Release the alpha brake and turn alpha to -90°.
5. Press the *Set –90°*- button.
6. Restart directly after the calibration to save the calibrated values.

4.38.6 Setup Collimator

Note!

The collimator type is pre-set from factory, only perform the calibration if necessary.

1. Navigate to: *SERVICE/SETTINGS/OTC/Collimator/Collimator*.

Fig. 4-196 Collimator view

2. Choose the collimator type used in the system.
3. Enter the collimator “Light on time”.
4. Restart directly after the calibration to save the calibrated values.

4.38.7 Stitching Overlap (option)

1. Navigate to: *SERVICE/SETTINGS/OTC/Stitching*.

Fig. 4-197

2. Enter the stitching “Overlap”.
   This parameter can be used to increase the overlap between images in a stitching examination.
3. Enter the stitching “Collimator Adjustment”.
   Increase this value if the collimator does not cover the detector edge.
4. Restart directly after the calibration to save the calibrated values.

4.38.8 WS Resolution (only manual Z-movement)

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

Calibration of the resolution requires two positions.

1. Navigate to: *SERVICE/SETTINGS/WS/Z CALIBRATION*.

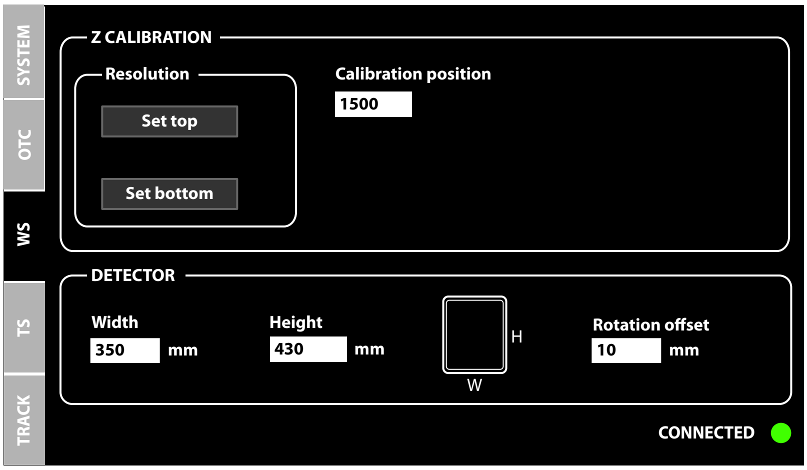


Fig. 4-198 Wall stand menu

2. Move the wallstand to the lowest position.
3. Position the OTC so the focal spot of the tube is aligned with the center of the detector.
4. Press the *Set bottom*- button.

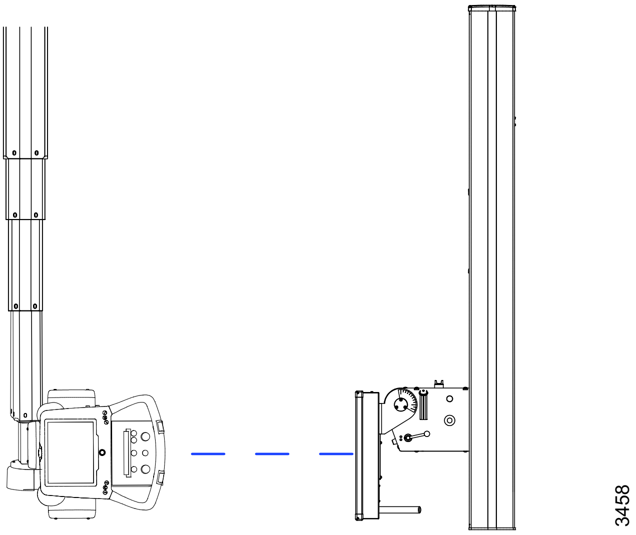


Fig. 4-199 Wall stand lowest position

5. Move the wallstand to the highest position.
6. Position the OTC so the focal spot of the tube is aligned with the center of the detector.

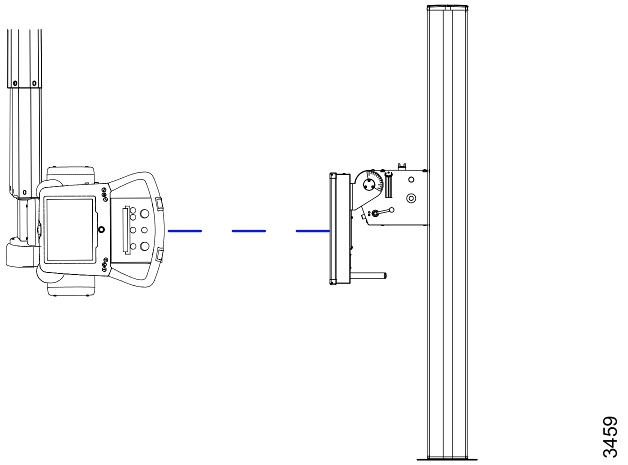


Fig. 4-200 Wall stand highest position

7. Press *Set top*- button.
8. Restart directly after the calibration to save the calibrated values.

4.38.9 WS Position (only manual Z-movement)

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

Note!

Perform the resolution calibration for the wallstand before doing the position calibration.

1. Navigate to: *SERVICE/SETTINGS/WS*.

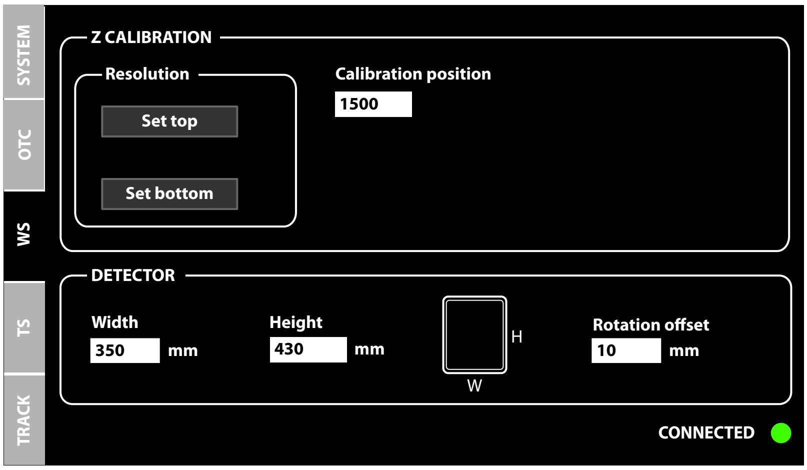


Fig. 4-201 Wall stand menu

2. Measure from the floor to the center of the detector (picture A in figure below), or to the image plane (surface of the detector) if it is a tiltable detector (picture B in figure below).

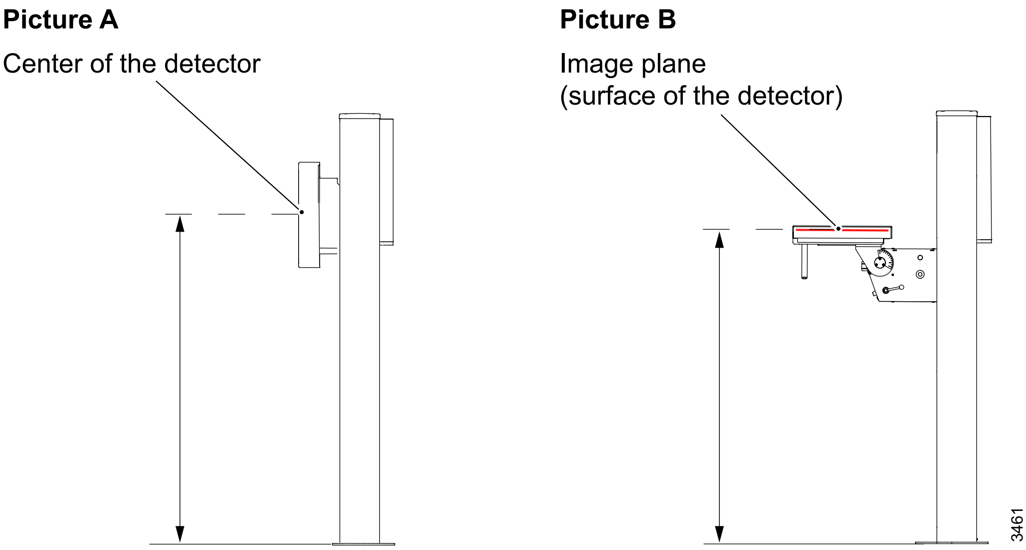


Fig. 4-202 Measuring the height

3. Enter the height in the "*Calibration position*" box. The height shall be entered in mm.
4. Restart directly after the calibration to save the calibrated values.

4.38.10 WS Position (only Z-motorized)

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

1. Navigate to: *SERVICE/SETTINGS/WS*.

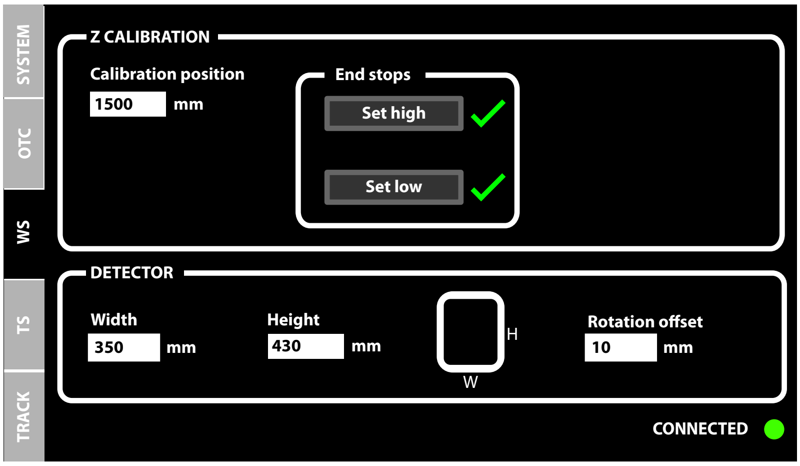


Fig. 4-203 Wall stand menu

2. Enter the height at the "*Calibration position*" box. The height shall be entered in mm.
3.
   a Fixed detector
   Measure from the floor to the center of the detector (picture A).
   b Tiltable detector
   Measure from the floor to the image plane (surface of the detector) (picture B).

Picture A

Center of the detector

Picture B

Image plane
(surface of the detector)

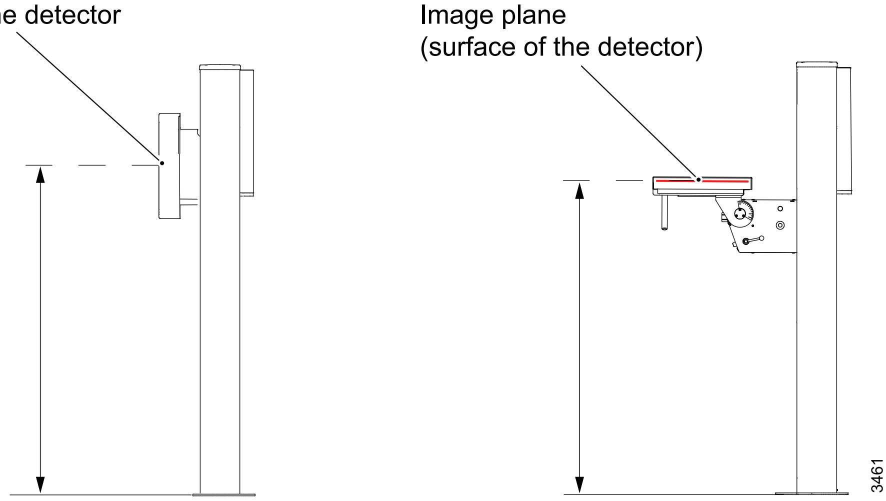


Fig. 4-204 Measuring the height

4. Restart directly after the calibration to save the calibrated values.

4.38.11 WS End Stop Z (only Z-motorized)

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

1. Navigate to: *SERVICE/SETTINGS/WS/Z CALIBRATION*.

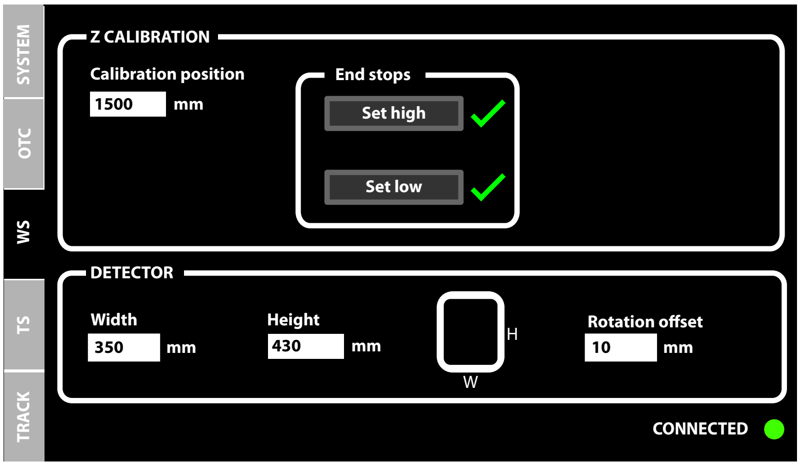


Fig. 4-205 Wall stand menu

2. Move the wallstand to the lowest position.
3. Position the OTC so the focal spot of the tube is aligned with the center of the detector.
4. Press the *Set low* - button.

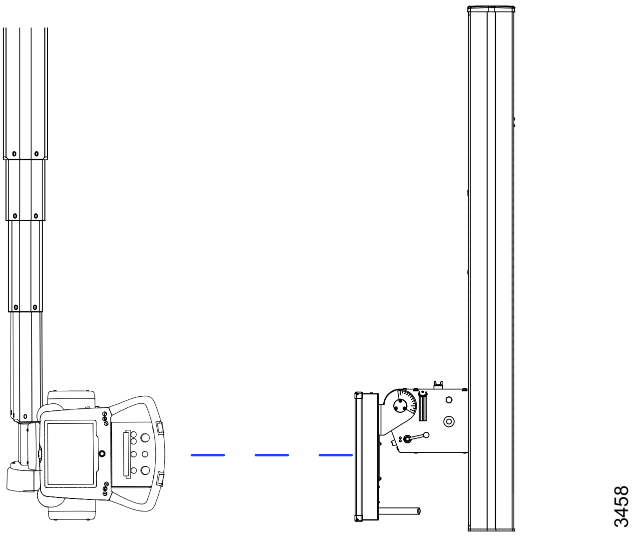


Fig. 4-206 Wall stand lowest position

5. Move the wallstand to the highest position.
6. Position the OTC so the focal spot of the tube is aligned with the center of the detector.

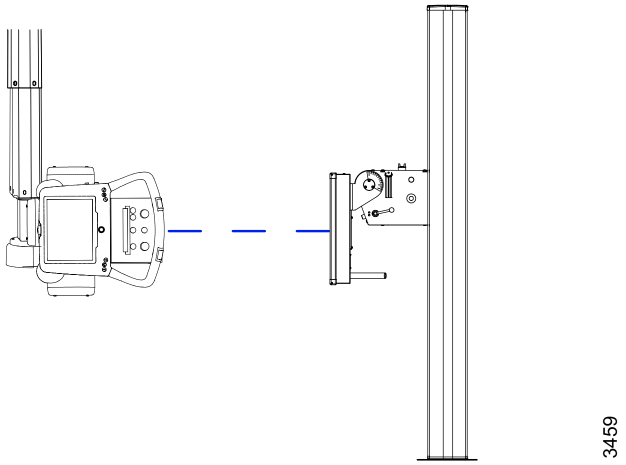


Fig. 4-207 Wall stand highest position

7. Press *Set high*- button.
8. Restart directly after the calibration to save the calibrated values.

4.38.12 WS Detector

Note!

The detector size and rotation offset are pre-set from factory.

1. Navigate to: *SERVICE/SETTINGS/WS*.

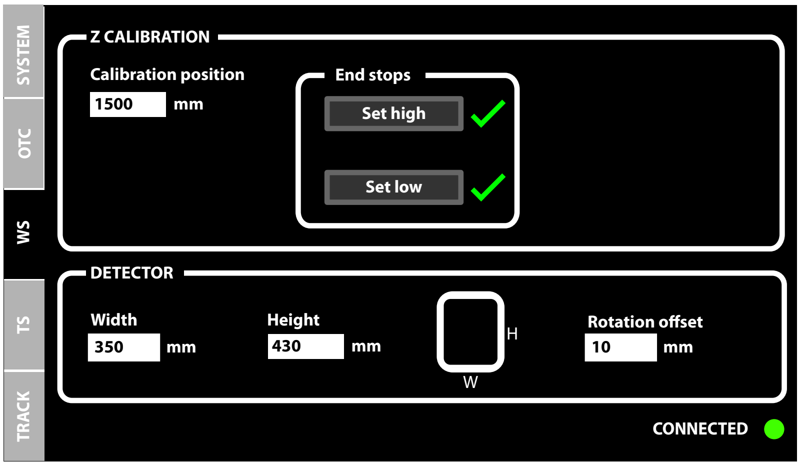


Fig. 4-208 Wall stand menu

2. Enter the detector active image area size.
3. Enter the rotation offset.

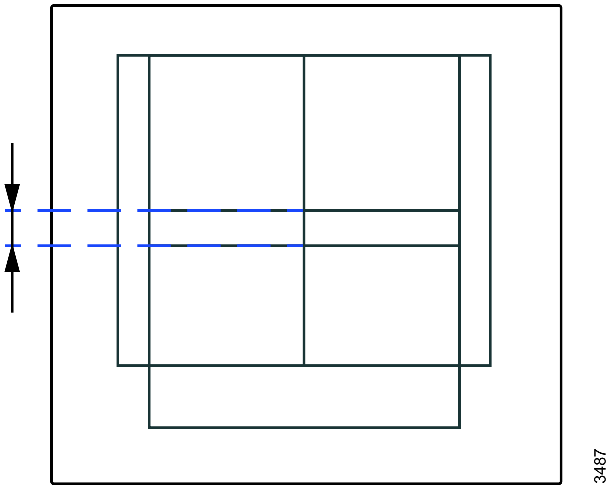


Fig. 4-209 Rotation offset

4. Restart directly after the calibration to save the calibrated values.

4.38.13 TS Resolution

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

Calibration of the resolution requires two positions.

1. Navigate to: *SERVICE/SETTINGS/TS*.

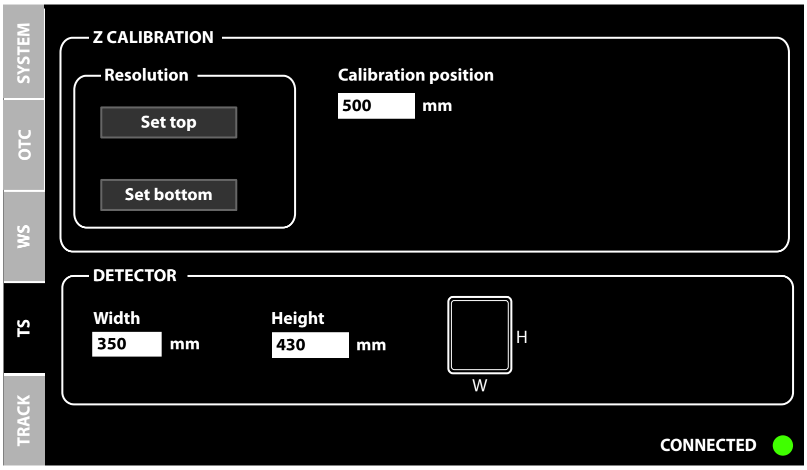


Fig. 4-210 Table stand view

2. Move the table to the lowest position.
3. Position the OTC so the focal spot of the tube is aligned with the image plane of the detector (the surface of the detector).

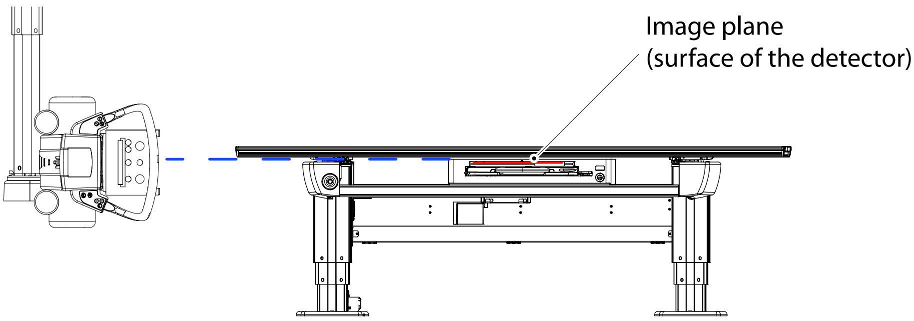


Fig. 4-211 Highest table position

4. Press the *Set bottom*- button.
5. Move the table to the highest position and position the OTC at the same spot as mentioned above.
6. Press the *Set top*- button.
7. Restart directly after the calibration to save the calibrated values.

4.38.14 TS Position

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

Note!

Perform the resolution calibration for the table stand before doing the position calibration.

1. Navigate to: *SERVICE/SETTINGS/TS*.

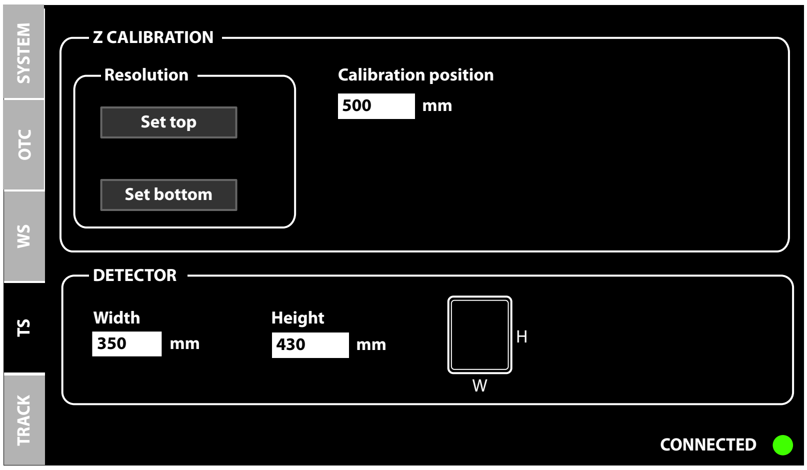
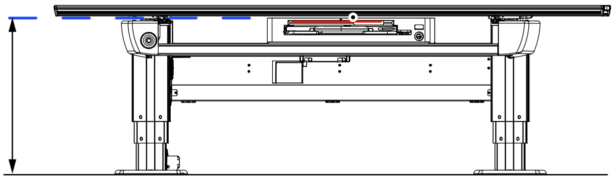


Fig. 4-212

2. Measure the distance from the floor to the surface of the detector.



3. Enter the height at the “*Calibration position*” box. The height shall be entered in mm.
4. Restart directly after the calibration to save the calibrated values.

4.38.15 TS Detector

Note!

The detector size is pre-set from factory.

Enter the detector active image area size.

4.38.16 TS and WS Tracking

Note!

A requirement for all calibrations in this chapter is that the OTC calibration has been performed.

1. Navigate to *SERVICE/SETTINGS/TRACK*.

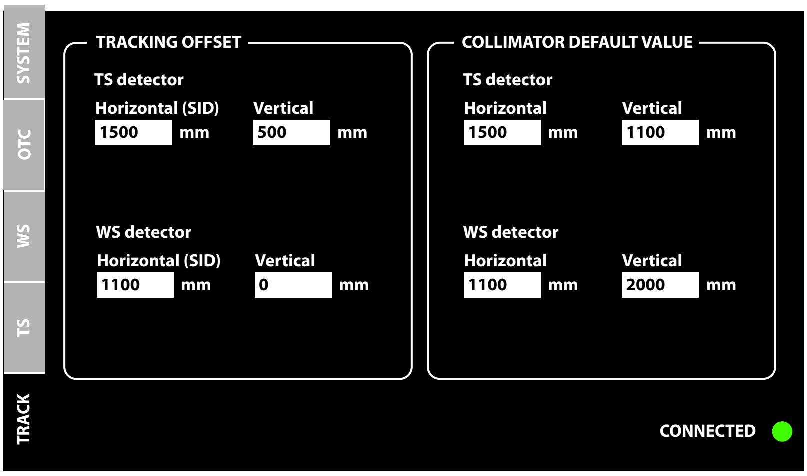


Fig. 4-213 Track menu

2. Tracking offset TS detector.

   Note!

   This is the pre-set value of the SID that the system will track.

   a Horizontal (SID)
   Enter the distance (in mm) from the focal spot of the tube to the image plane.

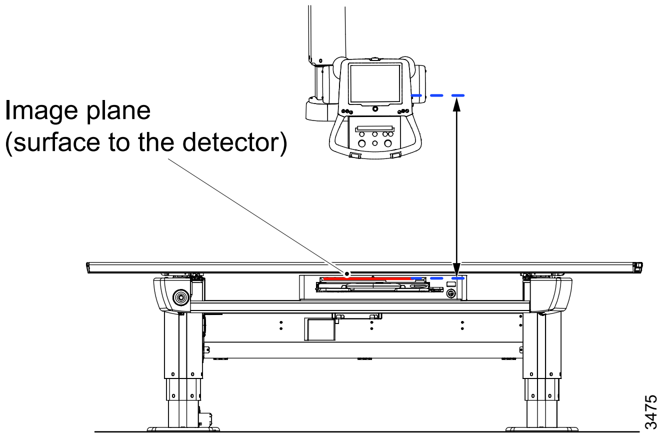


Fig. 4-214

b Vertical

Enter the distance (in mm) from the center of the vertical detector to the image plane of the horizontal detector.

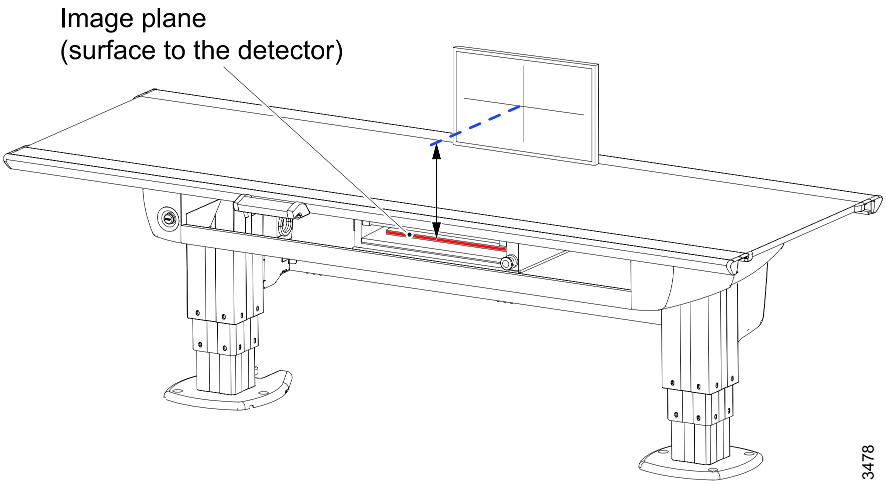


Fig. 4-215

3. Tracking offset WS detector.

Note!

This is the pre-set value of the SID that the system will track.

a Horizontal (SID)

Enter the distance (in mm) from the focal spot of the tube to the image plane.

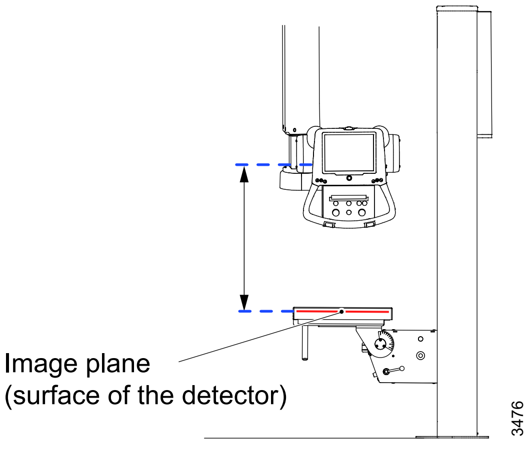


Fig. 4-216

b Vertical

Note!

Non tilt value 0 mm.

Enter the distance (in mm) from the center of the vertical detector to the image plane of the horizontal detector.

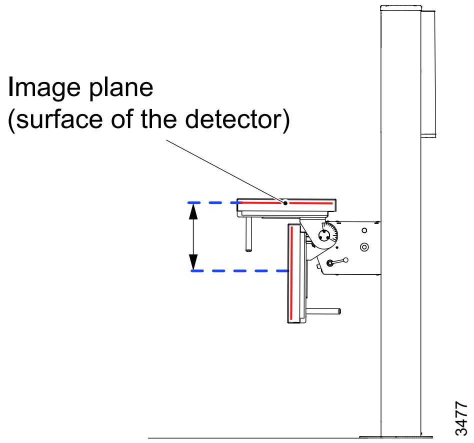


Fig. 4-217

4. Collimator default value TS detector.

Note!

This is the pre-set value of the SID used by the collimator.

a Horizontal
Enter the distance (in mm) from the focal spot of the tube to image plane.

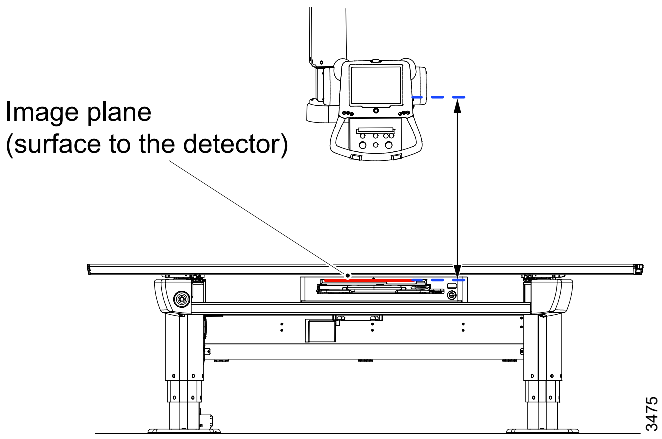
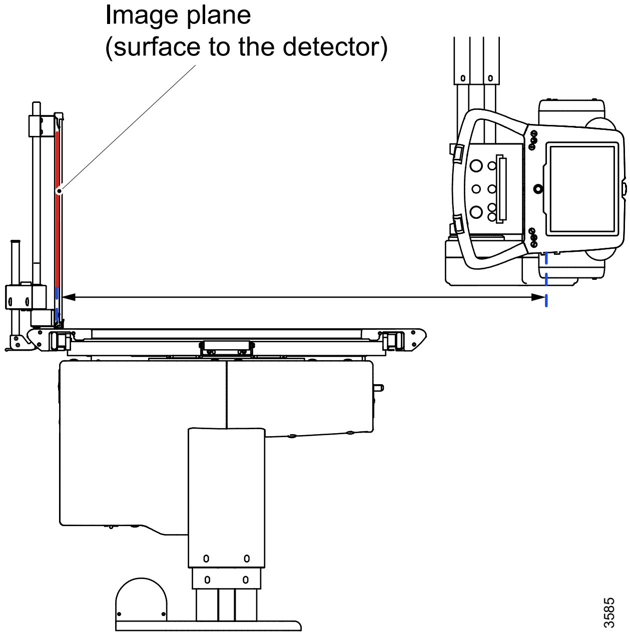


Fig. 4-218

b Vertical

Enter the distance (in mm) from the focal spot of the tube to image plane.



5. Collimator default value WS detector.

a Horizontal

Enter the distance (in mm) from the focal spot of the tube to image plane.

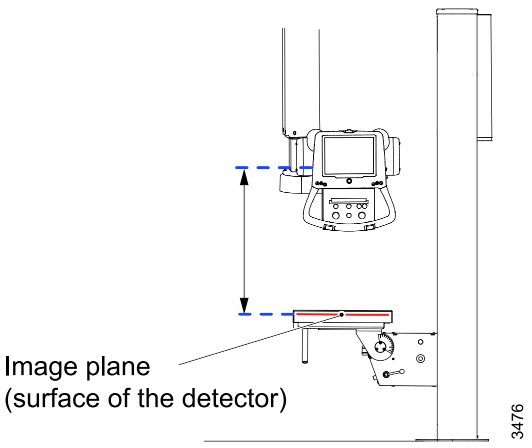


Fig. 4-219

b Vertical
Enter the distance (in mm) from the focal spot of the tube to image plane.

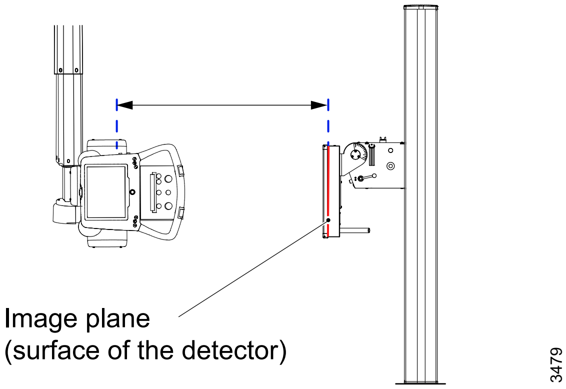


Fig. 4-220

6. Restart directly after the calibration to save the calibrated values.

4.39 AEC Calibration

4.39.1 Measurement of System Attenuation Factor

4.39.1.1 General

On delivery of the system, the AEC is pre-calibrated and should only need minor corrections. In case a new AEC chamber is to be installed, proceed as following:

4.39.1.2 Installation of New AEC Chamber

1. Turn all four gain potentiometers on the amplifier (not the AEC board in the generator) completely to minimum.

   Turn clockwise until you can hear a click on every turn, max 15 turns.
2. Turn all four gain potentiometers approx. 3.5 turns positive (3.5 turns anti clockwise).
3. All master gain adjustments need to be performed on the generator AEC board.
4. Make sure the central beam is perpendicular and centered relative to the image receptor.
5. Ensure the X-ray field completely covers all three AEC fields.
6. Ensure the size of the used phantom is larger than the X-ray field.
7. All AEC post exposure times should be between 30 and 100 ms.

   Adjust tube current if necessary.
8. Only one film speed is activated on delivery (medium).

4.39.2 Check of AEC Chamber Field Versus Image System AEC Fields

Check that all three AEC fields on both table and wallstand correspond to the selected fields in the image system.

1. Activate AEC on the image system.
2. Make sure that only the left field is activated.
3. Completely cover the left field on the table or wallstand with a suitable object with high attenuation, e.g. a lead apron.

   Make sure the other two fields are not covered, here center and right field.
4. Make an exposure with suitable exposure parameters, e.g. 50 KV, 10 mAs, no phantom, SID according to grid focal distance, X-ray beam covering all three AEC fields.

   The exposure should be finished by the backup timer.
5. Remove the object mounted in front of the relevant field and repeat the exposure. Now a very short exposure time should be the result.
6. Repeat on all fields of the table and wallstand.

4.39.3 Adjustment of Balance Between the Three Fields

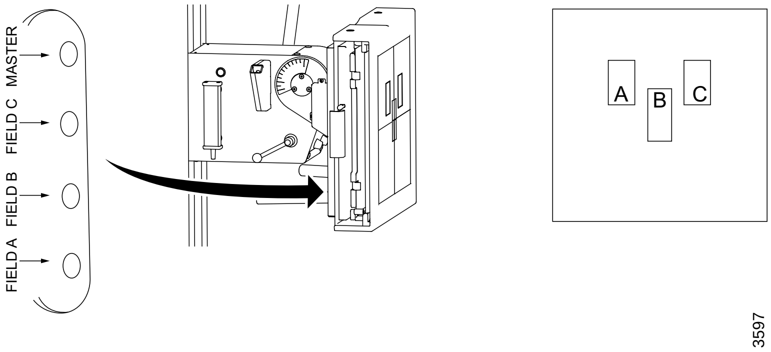


Fig. 4-221

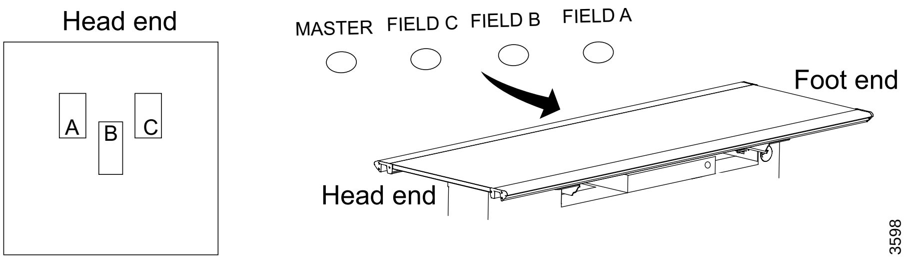


Fig. 4-222

4.39.3.1 Balance Calibrations in GenwareMP

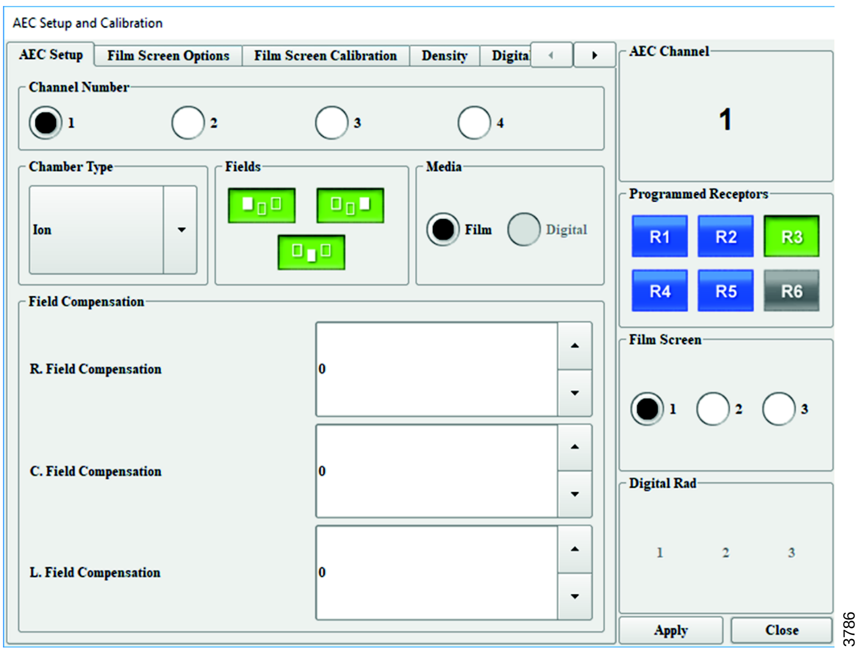


Fig. 4-223

4.39.3.2 Field Balance Check

Exposure parameters:	SID 100 cm
	80 KV
	25 mAs backup mAs
	25 mm aluminum Phantom in front of collimator
	AEC ON
	Collimator filter off = 0 mm AL and CU
	X-ray field set to cover all three fields
	Grid mounted. If more than one grid is available, mount the one with the highest ratio.

1. On the image system, activate only the left field (C).
2. Expose and note the mAs (or measure the radiation dose).
3. Repeat 1–2 for both the center (B) and right field (A).
4. Compare the three mAs (or µGy) results and if necessary adjust the corresponding gain potentiometer (field A-C potentiometer) until all three mAs values are the same. As accurate as possible, max deviation is ±10%.

   During this procedure, do not change the master gain potentiometer.

4.39.4 Fine Tuning of KV Compensation

4.39.4.1 Determination of AEC cut off EI

The required EI (Exposure Index) value is depending on detector type. The detector entrance dose is depending on the detector type/manufacturer and can be regulated by national requirements, if unknown, a suitable value is 180 (corresponds to ca 1,8 µGy detector entrance dose).

The CXDI software has AEC protocols used for calibration installed, which are used to calibrate the cut off EI level. The below exposure parameters might need to be adjusted for your own needs.

Exposure parameters:	SID according to grid focal distance
	75 KV
	Set the value in the 75 KV dialog box to 4,50, see **Fig. 4-224** (see figure 5 below) for the relevant AEC channel and filmscreen
	25 mAs backup mAs
	15 cm PMMA in front of the collimator, alternatively a suitable thickness of aluminium or a water phantom can be used.
	AEC ON
	Collimator filter off = 0 mm AL and CU
	X-ray field covering all AEC fields but smaller than the Phantom.
	Grid mounted (If more than one Grid is available, mount the one with the highest Ratio).
	Center field

1. Make an exposure.

2. Note the resulting EI value.
   Make sure the post exposure time is between 30–100 ms, adjust tube mA if necessary
3. Adjust the master gain on the generator AEC board and repeat the procedure until the right EI value is reached.
   A suitable value is 180.

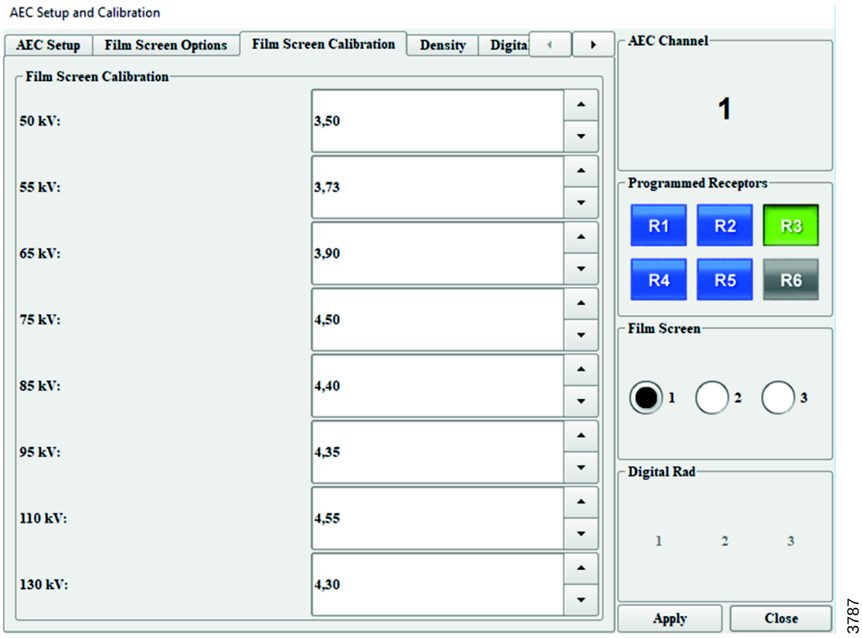


Fig. 4-224 AEC setup and calibration

4.39.4.2 KV Compensation Calibration

1. Repeat the **4.39.4.1 Determination of AEC cut off EI** procedure, with the KV levels (except 75 KV) shown in **Fig. 4-224**, using the phantom sizes in the table:

KV	Acrylic Phantom (cm
50	10
55	10
65	10
75	15
85	15
95	15
110	20
130	20

2. For every KV level (except 75 KV), adjust the corresponding dialog box value until the correct EI is reached.
3. Make sure the post exposure time is between 30–100 ms, adjust tube mA if necessary.
4. Repeat for both the table and wallstand.

Remember to adjust the SID according to the grid focal distance when changing between table and wallstand.

4.40 Acceptance Tests

Note!

Operating personnel must be familiar with the system and the instructions given in this manual before using the equipment.

4.40.1 General

This section goes through the functional X-ray acceptance testing criteria that should be used to determine necessary compliance with the general performance requirements of the manufacturer.

It is not intended to prove conformance for all applicable regulatory requirements. The complete assessment of compliance regulatory as well as local/national requirements relies on the installer of the system.

For further acceptance test, please check the generator's Technical Manual and/or the relevant Standard(s).

4.40.1.1 System Requirements

- Make sure the system is installed as described in *Installation* in chapter 4 of the Installation and Service Manual.
- Make sure the generator is setup, installed and calibrated correctly.

4.40.1.2 Terminology and Definitions

AEC	Automatic Exposure Control, in RAD mode. In an X-ray Generator, mode of operation in which one or more loading factors are controlled automatically in order to obtain at a preselected location a desired quantity of radiation.
kV	Peak voltage applied between the anode and cathode of an X-ray tube, in thousands of volts.
mA	Average X-ray tube current, in milliAmperes, during the irradiation time.
mAs	Product of X-ray tube current (mA) and time (s).
SID	Source to Image Distance
Time	Irradiation time, in milliseconds (ms) or seconds (s). Irradiation time represents the time interval between the instant the tube potential has risen for the first time to a value of 80% and the instant at which it finally drops below the same value.
HVL	Half Value Layer. The thickness in material, in mm Aluminum, at which, when inserted in the radiation beam, the air kerma (μGy) is reduced to half.

Aluminum filter	Aluminum sheets of 99% purity used to measure the HVL value. Sheets of different thickness are required (e.g. 1, 0.5, 0.1 and 0.05 mm).
Phantom	Sheets of acrylic glass (PMMA) of a suitable thickness (e.g. 2,5 cm) with which a phantom of 10, 15, 20 can be build. The size should be such that they cover the whole receptor area. Instead of acrylic, aluminum sheets of corresponding attenuation can be used.

Note!

- All tests should be, unless stated otherwise, performed under narrow beam conditions.
- During all tests, unless stated otherwise, the same loading factors SID and collimation should be used.
- During every test, unless stated otherwise, make sure no extra filters are mounted.
- Use, unless stated otherwise, an SID of 1 m.

4.40.2 Peak Tube Potential

Measure the tube voltage:

Test equipment	Measure points
Non-invasive meter	Directly in the x-ray beam
Single channel oscilloscope	TP2 (KV total) and TP18 (ground)
Multi channel oscilloscope	TP2 (KV total) and TP18 (ground) TP17 (main gate) and TP18 (ground)

For location of test points, see .

4.40.2.1 kV accuracy

Perform the following exposures (12) using the loading factors of **Table 4-6** and verify the accuracy of the tube kV.

The deviation between the set KV and the measured KV at the different loading factors combinations should not exceed 10%.

The same measurement can be used to measure the exposure time, see **4.40.4 Exposure Time, Page 280**.

All tests must be passed for compliance.

Table 4-6

Set KV (kV)	Set mA (mA)	Set time (ms)	Measured kV	Compliance criteria	Test passed	Test failed
60	50	100		60 ± 10%		
60	100	100		60 ± 10%		
60	250	100		60 ± 10%		
80	50	100		80 ± 10%		
80	100	100		80 ± 10%		
80	250	100		80 ± 10%		
100	50	100		100 ± 10%		
100	100	100		100 ± 10%		
100	250	100		100 ± 10%		
120	50	100		120 ± 10%		
120	100	100		120 ± 10%		
120	250	100		120 ± 10%		

4.40.3 Tube Current

Measure the tube current and mAs:

Test equipment	**Measure points**
Invasive mAs meter or non-invasive meter	TP14 and TP15 (real tube current)
Single channel oscilloscope	TP9 (tube current) and TP18 (ground)
If multichannel oscilloscope is available	TP9 (tube current) and TP18 (ground) Trigger points: TP17 (main gate) and TP18 (ground)

For location of test points, see .

4.40.3.1 mA accuracy

Perform the following (12) using the loading factors of **Table 4-7**and verify the accuracy of the tube current.

The deviation between the set mA and the measured mA of the different loading factor combinations shall not exceed ±20%.

All tests must be passed for compliance.

Table 4-7

Set KV (kV)	**Set mA (mA)**	**Set time (ms)**	**Measured mA**	**Compli-ance criteria**	**Test passed**	**Test failed**
60	50	100		50 ± 20%		
60	100	100		100 ± 20%		
60	250	100		250 ± 20%		
80	50	100		50 ± 20%		
80	100	100		100 ± 20%		
80	250	100		250 ± 20%		
100	50	100		50 ± 20%		
100	100	100		100 ± 20%		
100	250	100		250 ± 20%		
120	50	100		50 ± 20%		
120	100	100		100 ± 20%		
120	250	100		250 ± 20%		

4.40.4 Exposure Time

Use a non-invasive meter or an oscilloscope to measure exposure time directly in the x-ray beam.

Use the same measurement as the KV measurement, see **4.40.2.1 kV accuracy, Page 277**.

For location of test points, see .

4.40.4.1 Irradiation Time Accuracy

Perform the following exposures (12) using the loading factors of **Table 4-8** and verify the accuracy of the irradiation time.

Table 4-8

Set KV (kV)	Set mA (mA)	Set time (ms)	Measured ms	Compliance criteria	Test passed	Test failed
60	50	100		100 ± (10% + 1 ms)		
60	100	100		100 ± (10% + 1 ms)		
60	250	100		100 ± (10% + 1 ms)		
80	50	100		100 ± (10% + 1 ms)		
80	100	100		100 ± (10% + 1 ms)		
80	250	100		100 ± (10% + 1 ms)		
100	50	100		100 ± (10% + 1 ms)		
100	100	100		100 ± (10% + 1 ms)		
100	250	100		100 ± (10% + 1 ms)		
120	50	100		100 ± (10% + 1 ms)		
120	100	100		100 ± (10% + 1 ms)		
120	250	100		100 ± (10% + 1 ms)		

4.40.5 Beam Quality

Some non-invasive instruments directly measure the HVL value. If such instrument is not available, an air kerma meter is needed to measure the HVL value

HVL measurement procedure (with air kerma meter):

1. Make an exposure with the required loading factors and register the air kerma. Make sure no objects, e.g. filters are mounted between tube focal spot and the air kerma meter.
2. Insert aluminum filters in the x-ray beam, make an exposure and register the air kerma. The measured air kerma should be half of the air kerma measured in step 1. If not, increase or reduce the thickness of the filters and repeat the exposure.
3. The thickness of the aluminum required is called the HVL and its unit is mm Al.

Note!

Use the same loading factors, collimation and SID throughout the following steps.

Determine the HVL layer value at 3 different KV levels. Use each of the following loading factors, see **Table 4-9**. The compliance criteria is depending on the KV levels.

All tests must be passed for compliance.

Table 4-9

Set KV (kV)	Set mA (mA)	Set time (ms)	HVL value	Compliance criteria	Test passed	Test failed
50	100	100		≤ 1.8 mmA		
80	100	100		≤ 2.9 mmA		
120	100	100		≤ 4.3 mmA		

4.40.6 Reproducibility

Use the following calibrated measurement device:

- X-ray dose meter

Perform the following exposures (3) using the loading factors of and verify the dose (uGy). Compliance is achieved if the coefficient of variation for each of the measurement series and the average air kerna does not exceed 0.05.

$$C = \frac{1}{\bar{x}} \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

C is coefficient of variation.

$\bar{x}$ is the average of the measured air kerma values $\left(\frac{X1 + X2 + X3}{3}\right)$

This test has to be performed with the loading factors of **Table 4-10** and **Table 4-11**.

All tests must be passed for compliance.

0.95 * (X1+X2+X3)/3 $\leq$ X1 $\leq$ 1.05 * (X1+X2+X3)/3

0.95 * (X1+X2+X3)/3 $\leq$ X2 $\leq$ 1.05 * (X1+X2+X3)/3

0.95 * (X1+X2+X3)/3 $\leq$ X3 $\leq$ 1.05 * (X1+X2+X3)/3

Table 4-10

Set KV (kV)	Set mA giving dose 1-5 µGy	Set time between 10-320 ms	Measured µGy	Compliance criteria	Test passed	Test failed
80			X1			
80			X2			
80			X3			

Table 4-11

Set KV (kV)	Set mA giving dose 1-5 µGy ……mA	Set time between 10-320 ms ……ms	Measured µGy	c (coefficient of variation)	Test passed	Test failed
120			X1			
120			X2			
120			X3			

4.40.7 AEC (Automatic Exposure Control)

Use air kerma meter and plexiglas Phantom (or Phantom with similar attenuation).

In AEC mode, perform the following exposures (3) on every measuring field.

Use the loading factors and phantom sizes in **Table 4-12** - **Table 4-18** and measure the dose (µGy)*¹. We assume two chambers (table and wallstand), each having three measuring fields (left, center, right).

Compliance is achieved if:

- The maximum dose error between two adjacent KV steps is between -15% and 18%. Example for 60 KV:

  $-15\% \leq (1-(X1/X2)) * 100 \leq 18\%$

  $-15\% \leq (1-(X1/X3)) * 100 \leq 18\%$

  $-15\% \leq (1-(X2/X1)) * 100 \leq 18\%$

  $-15\% \leq (1-(X2/X3)) * 100 \leq 18\%$

  $-15\% \leq (1-(X3/X1)) * 100 \leq 18\%$

  $-15\% \leq (1-(X3/X2)) * 100 \leq 18\%$

- The maximum dose error between any dose measurement and the mean of all dose measurements is between -20% and 25%. Example for the table Left field:

  $-20\% \leq |1-(X1/(X1+X2+X3)/3)| * 100 \leq 25\%$

  $-20\% \leq |1-(X2/(X1+X2+X3)/3)| * 100 \leq 25\%$

  $-20\% \leq |1-(X3/(X1+X2+X3)/3)| * 100 \leq 25\%$

*¹: The 60601-2-54 § 203.6.3.2.102 standard defines the acceptance limits in optical density. To make production testing easier we have converted these optical density limits into the following dose limits:

Table 4-12

OD limit	Lower dose limits	Upper dose limits
±0.1	-10.8%	+12.2%
±0.15	-15.86%	+18.85%
±0.2	-20.87%	+25.87%

4.40.7.1 Table

Table 4-13 Left field

Set KV (kV)	Set mA (mA)	Phantom (cm)	Measured dose (μGy)	Compliance criteria	Test passed	Test failed
60	100	10	X1	See above		
80	100	15	X2	See above		
100	100	20	X3	See above		

Table 4-14 Center field

Set KV (kV)	Set mA (mA)	Phantom (cm)	Measured dose (μGy)	Compliance criteria	Test passed	Test failed
60	100	10	X1	See above		
80	100	15	X2	See above		
100	100	20	X3	See above		

Table 4-15 Right field

Set KV (kV)	Set mA (mA)	Phantom (cm)	Measured dose (μGy)	Compliance criteria	Test passed	Test failed
60	100	10	X1	See above		
80	100	15	X2	See above		
100	100	20	X3	See above		

4.40.7.2 Wall stand

Table 4-16 Left field

Set KV (kV)	Set mA (mA)	Phantom (cm)	Measured dose (µGy)	Compliance criteria	Test passed	Test failed
60	100	10	X1	See above		
80	100	15	X2	See above		
100	100	20	X3	See above		

Table 4-17 Center field

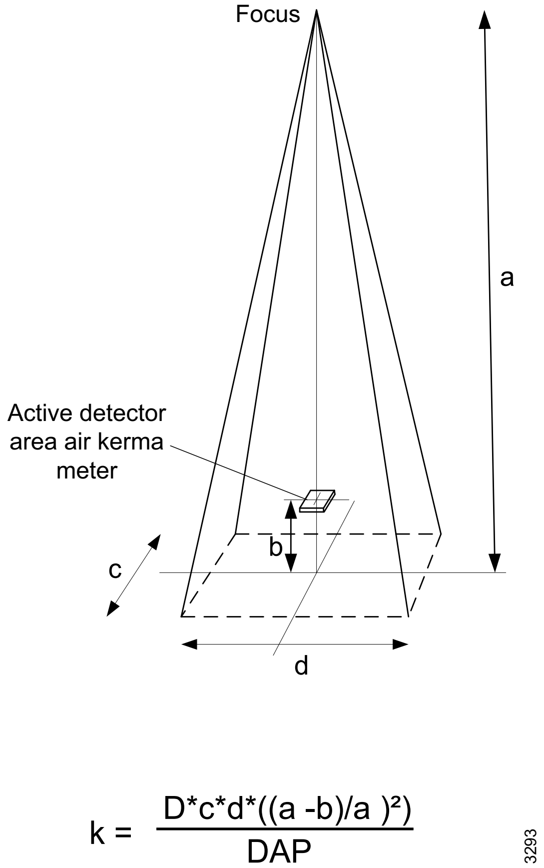
Set KV (kV)	Set mA (mA)	Phantom (cm)	Measured dose (µGy)	Compliance criteria	Test passed	Test failed
60	100	10	X1	See above		
80	100	15	X2	See above		
100	100	20	X3	See above		

Table 4-18 Right field

Set KV (kV)	Set mA (mA)	Phantom (cm)	Measured dose (µGy)	Compliance criteria	Test passed	Test failed
60	100	10	X1	See above		
80	100	15	X2	See above		
100	100	20	X3	See above		

4.40.8 DAP Calibration

- Calculate the correction factor with an air kerma meter.
  Make sure to use the right DAP value unit. The image system uses dGy/cm2.



$$k = \frac{D*c*d*((a-b)/a)^2}{DAP}$$

Fig. 4-225 DAP test

K = DAP correction factor

D = measured dose with air kerma instrument (mGy)

a = focus distance (cm)

b= Distance to active detector area of air kerma meter (cm)

c = height of X-ray beam (cm)

d = width of X-ray beam (cm)

DAP = DAP value (mGycm²)

- In the generator software, Genware MP, check that the *DAP Device Type 3* is chosen, and the *Test value* is set to ‘1000’.
- Write the calibration value in the setup window.
  Press *Apply*.

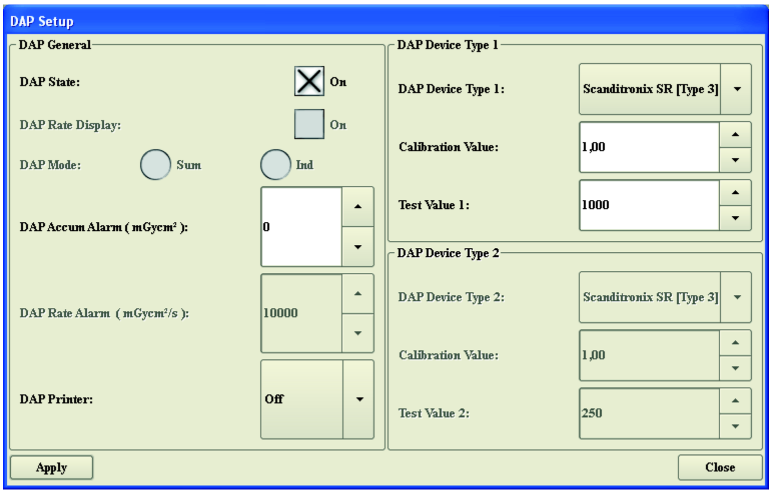


Fig. 4-226

A DAP value test is performed at the manufacture and needs to be checked again after the installation.

4.41 Check Indication Light and Collimator Light

Select table workstation from image system and select table tracking on the OTC display:

1. Make sure the table indication light is lit and that the OTC display handle shows table tracking mode.
2. Move the table top and the collimator lamp shall turn on.

Select wallstand workstation from image system and select wallstand tracking on the OTC display:

1. Make sure the wallstand indication light is lit and that the OTC display handle shows wallstand tracking.
2. Move the wallstand Z up or down and the collimator lamp shall turn on.

5 Setup

5.1 Computer Network Settings

Make sure that the 2000 system is connected to the Canon NE PC (Ethernet cable). *See SBD_1000_C* for reference.

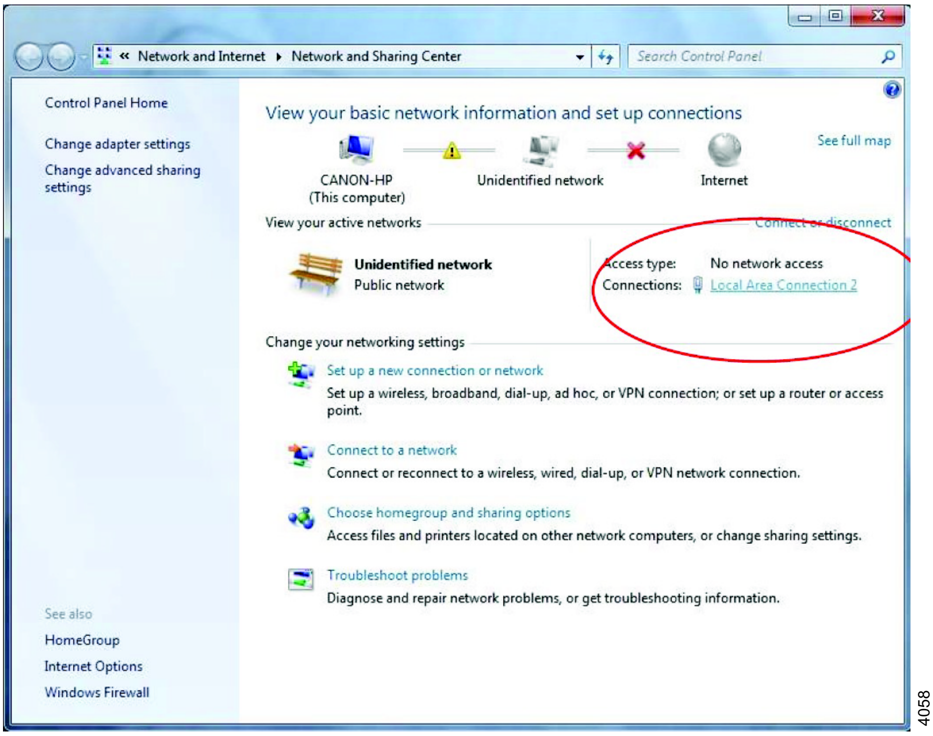


Fig. 5-1 Network and Sharing Center

1. Open the “Network and Sharing Center” from the “Control Panel”.
2. Click the Connection name, can be other than “Local Area Connection 2” as in **Fig. 5-1**.

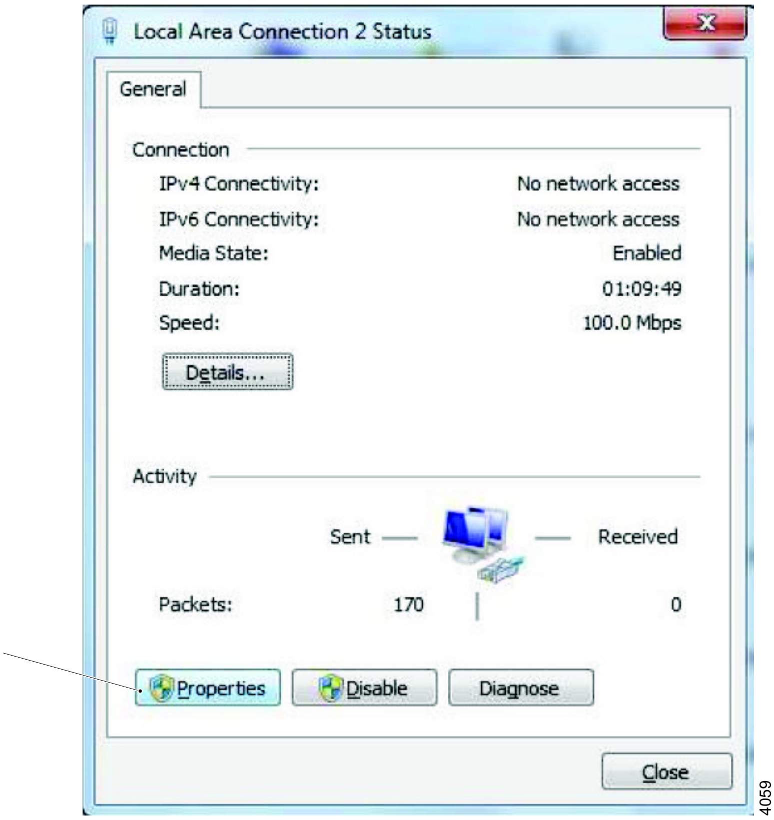


Fig. 5-2 Local Area Connection 2 status

3. Click `Properties`.

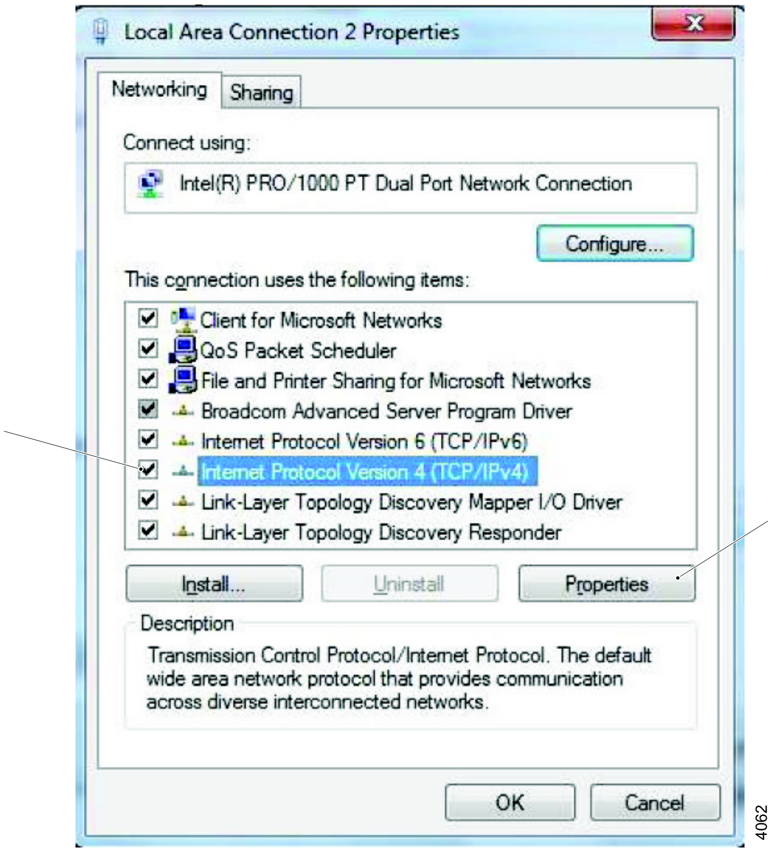
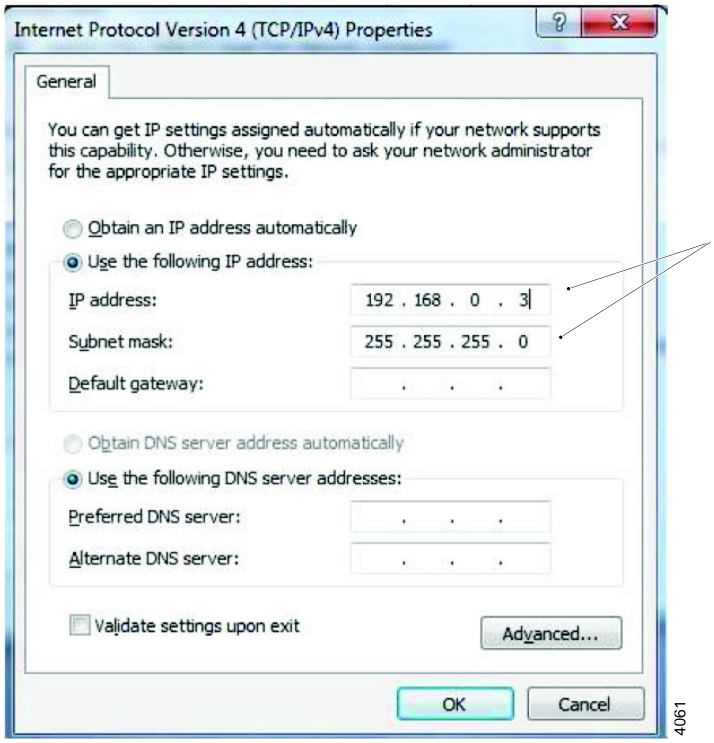


Fig. 5-3 Local Area Connection 2 Properties

4. Select `Internet Protocol Version 4 (TCP/IP)` and click `Properties`.

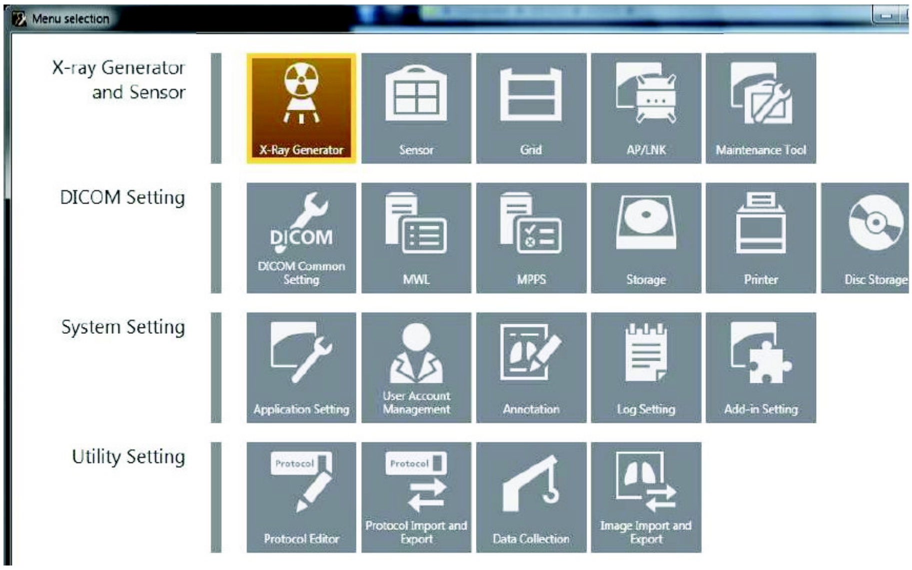


4061

Fig. 5-4 Internet Protocol Version 4(TCP/IP) Properties

5. Enter settings for the IP address as in **Fig. 5-4**, and then click `OK`

5.1.1 Canon Software IP Settings



4060

Fig. 5-5 Canon Service tool

1. Start Canon Service tool
2. Select `X-Ray Generator`.

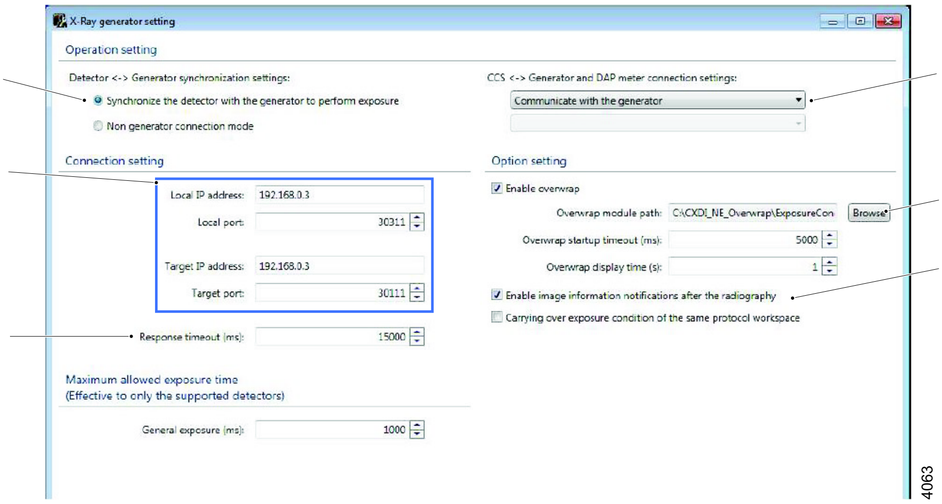


Fig. 5-6 X-Ray Generator setting

3. In `Operation setting`:
   - Select `Synchronize the detector with the generator to perform exposure`
   - Select `Communicate with the generator`
4. In `Connection setting`:
   - Set Local IP addresses and ports according to **Fig. 5-6**.
   - Set `Response timeout (ms)` to 15000.
5. In `Option setting`:
   - Select `Enable overwrap`

     Click `Browse` at line `Overwrap module path` and select: `C:\CXDI_NE_Overwrap \ExposureCondition.exe`.
   - Select `Enable image information notification after the radiography`”
6. Click `OK`.

5.1.2 Generator Settings

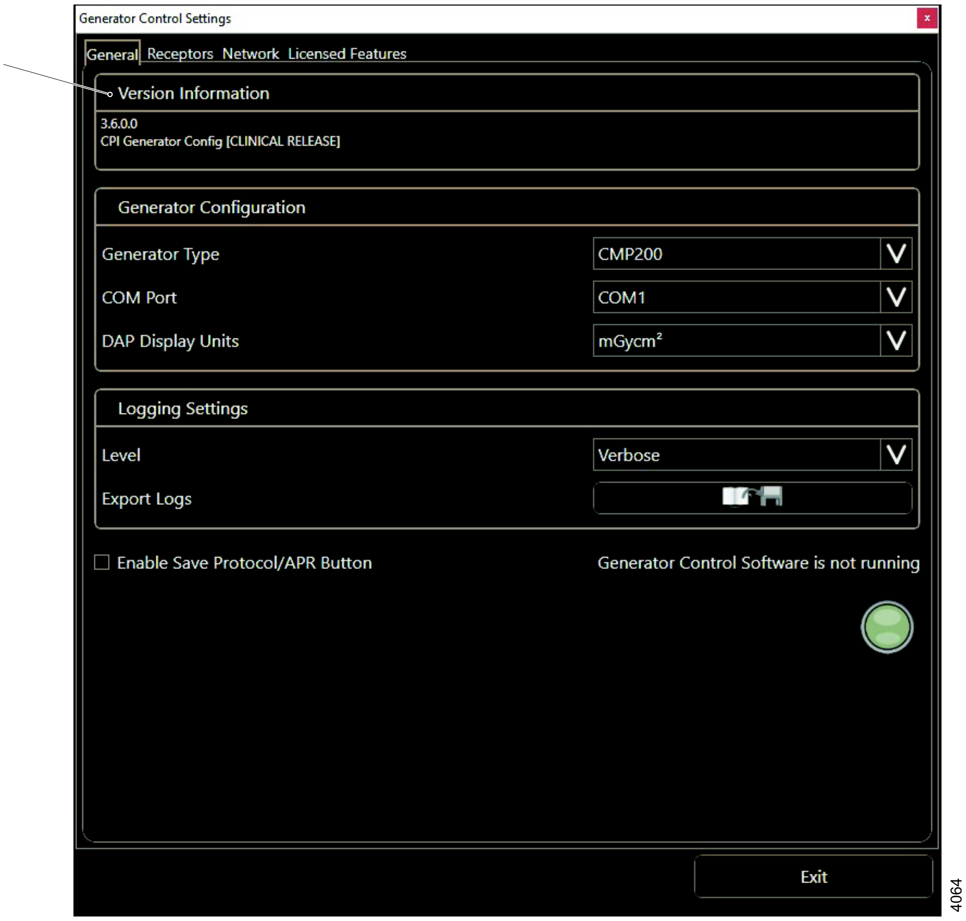


Fig. 5-7 Generator Control Settings, tab Genereal

1. Select tab `General`
2. Check `Version information` to confirm that the version corresponds with the software. See Release Note *SwRLN_0072-C_System_x.x* for further reference.
3. Start the generator control software: GenConfig.exe (folder C:\CXDI_NE_Overwrap\)

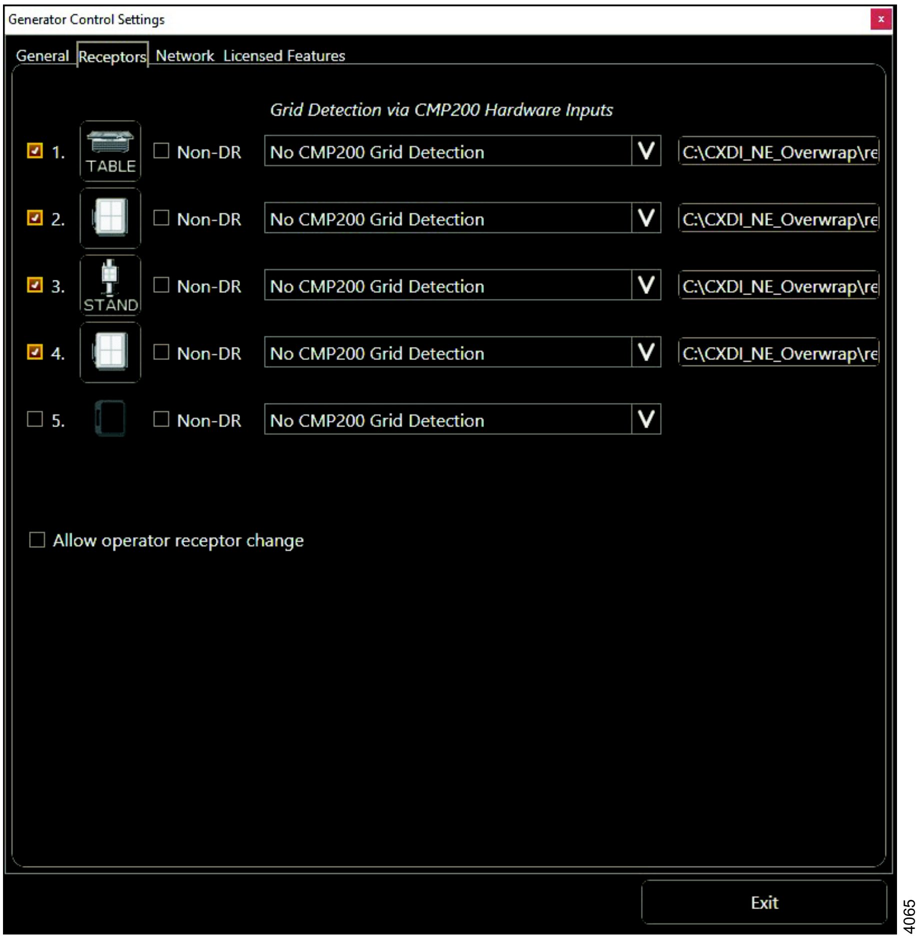


Fig. 5-8 Generator Control Settings, tab Receptors

4. Select tab `Receptors`.
5. Check all receptors active in the system, and select an icon.
   Grid detection via CMP200 Hardware inputs is not used.

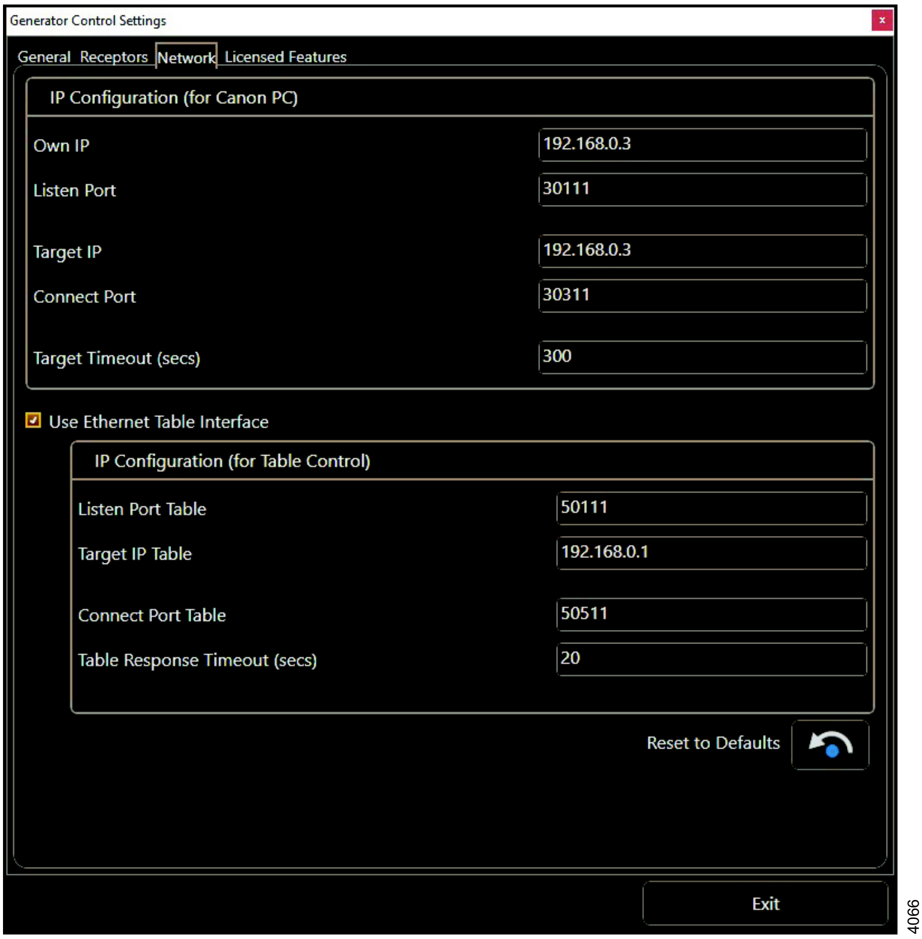
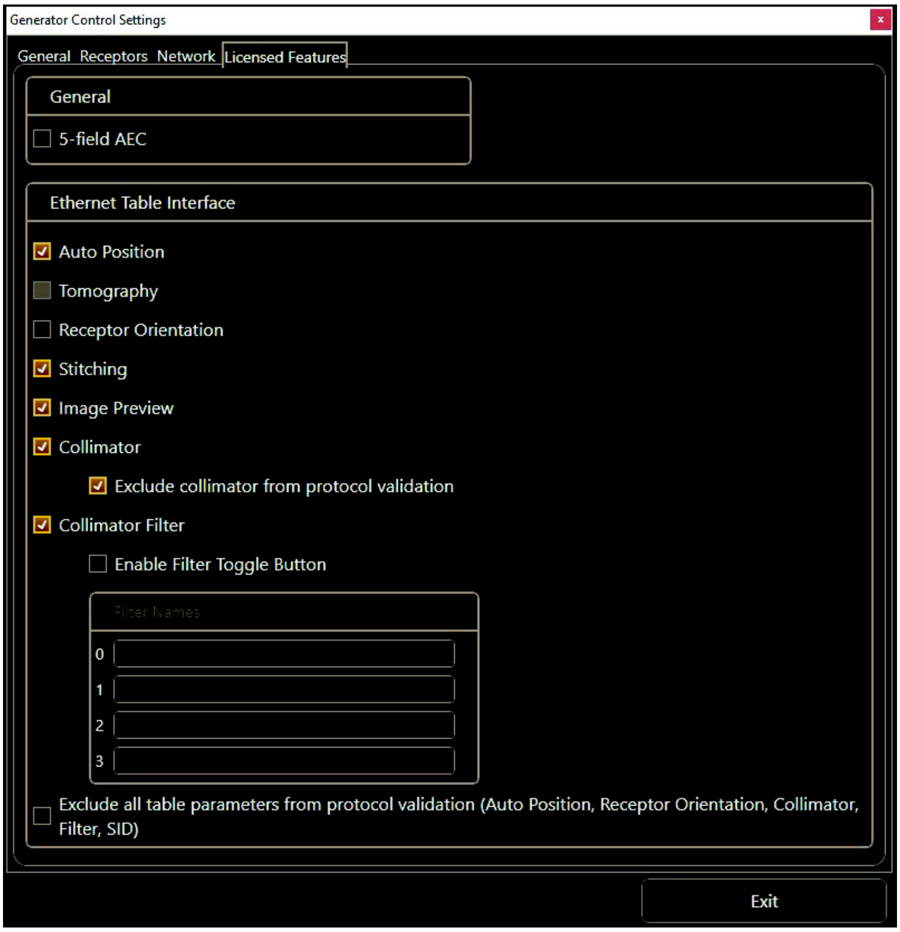


Fig. 5-9 Generator Control Settings, tab Network

6. Select tab `Network`.
7. The network settings shall be configured according to **Fig. 5-9**.



4067

Fig. 5-10 Generator Control Settings, tab Licensed Features

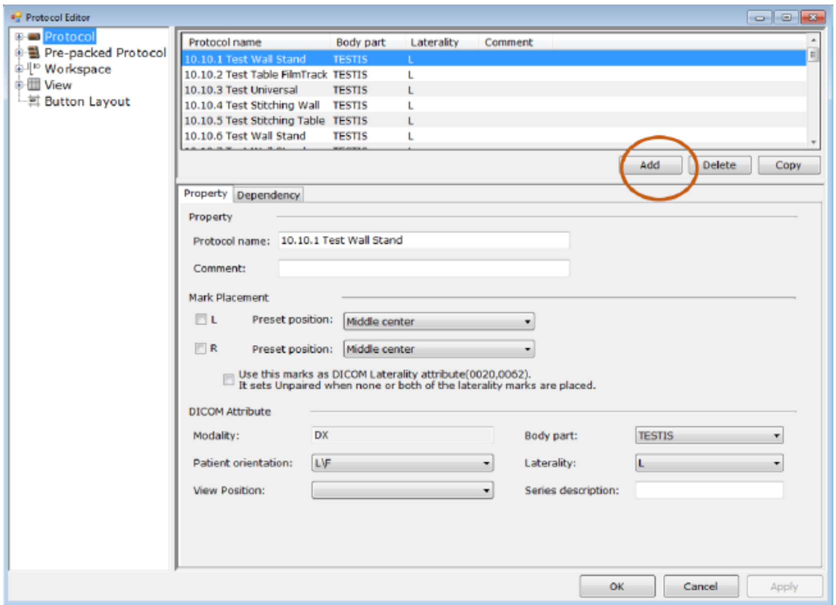
8. Select tab `Licensed Features`.
9. The licensed features settings shall be configured according to **Fig. 5-10**.
   Depending on the license installed in the system, some features may not be available.

5.2 Static Protocol Setup

3515

Fig. 5-11 Canon ServiceTool

1. Enter Canon ServiceTool.
2. Select `Utility Setting/Protocol Editor`.



3516

Fig. 5-12 Protocol Editor

3. Define a protocol and then click `Add`.

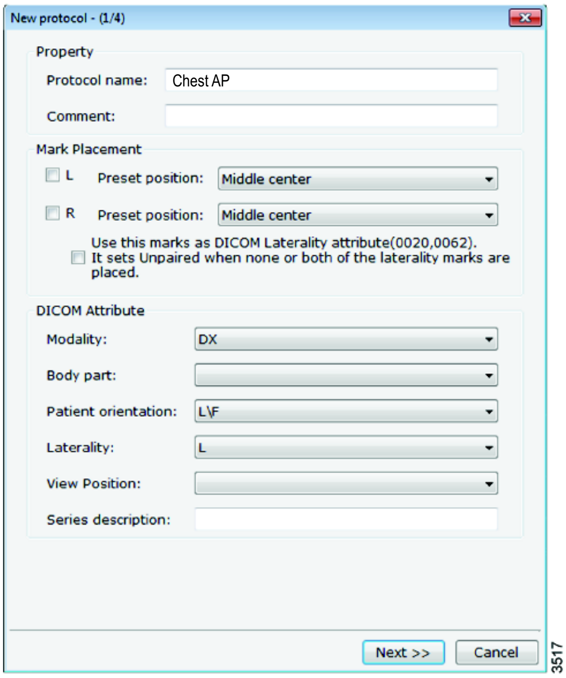


Fig. 5-13 New protocol 1/4

4. Assign a `Protocol name` to the new protocol, and then click `Next`.

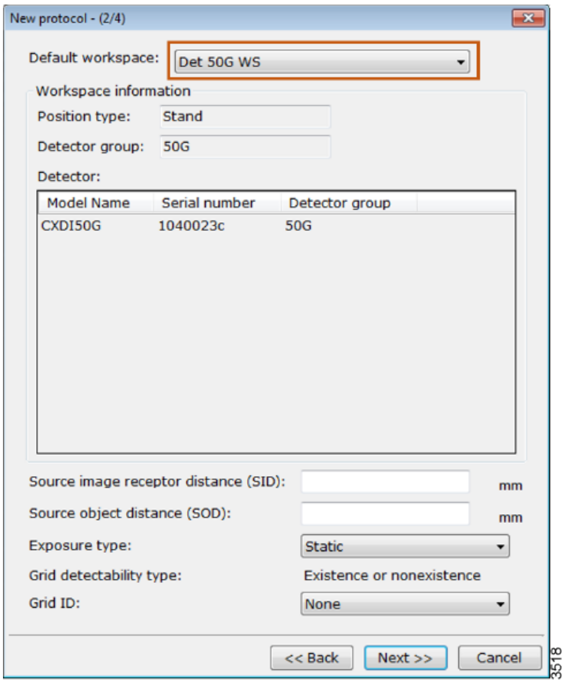
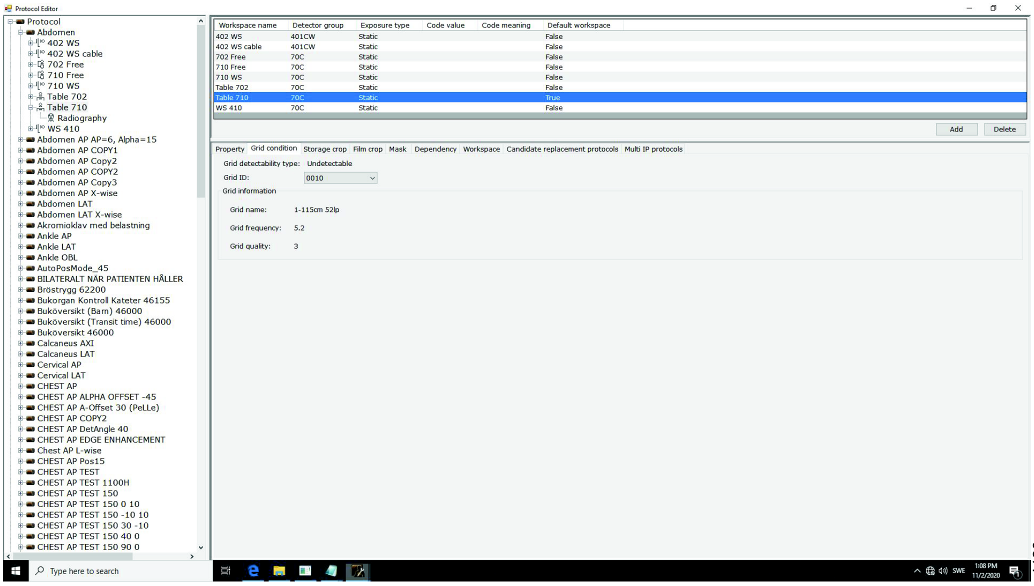


Fig. 5-14 New protocol 2/4

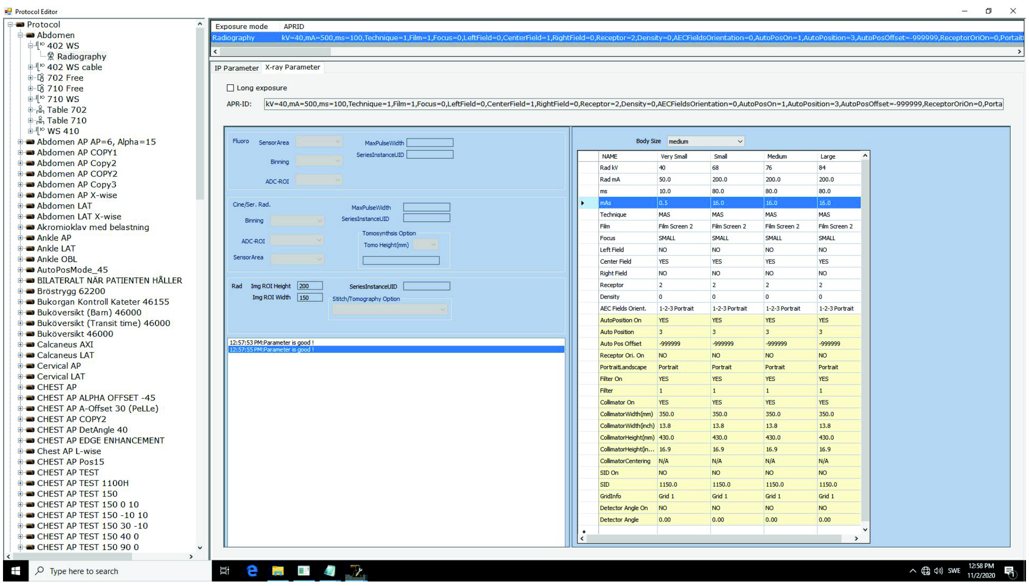
5. Select an appropriate `Default Workspace`.
6. Select `Static` as `Exposure Type`.
   Click `Next`.



4126

Fig. 5-15 Grid Abdomen Table

Grid type is defined under under `Grid condition`



4125

Fig. 5-16 X-ray Parameter_Service

7. Define Exposure parameters for the new protocol.

For Auto positioning functionality, the following settings are important:

- Define the appropriate `Receptor` number.
  - 1- Table, 2- Free, 3- Wall stand, 4- Free
- Set `AutoPosition On` to `YES`.
- Define the appropriate `Auto Position` number.
- Define an `Auto Pos Offset`, if applicable
- Define a `Detector angle` value, if applicable.

For Automatic collimator functionality, the following settings are important:

- Set `Filter On` to `YES`.

- Define the appropriate `Filter` number.
- Set `Collimator On` to `YES`”.
- Define `CollimatorWidth` and `CollimatorHeight` (mm). Values are limited by actual detector size.
- Set `CollimatorCentering`, if required.

For Grid identification functionality, the following settings are important:

- Set `GridInfo` to `No grid`, `Grid 1`, `Grid 2` 2 or `Grid 3`

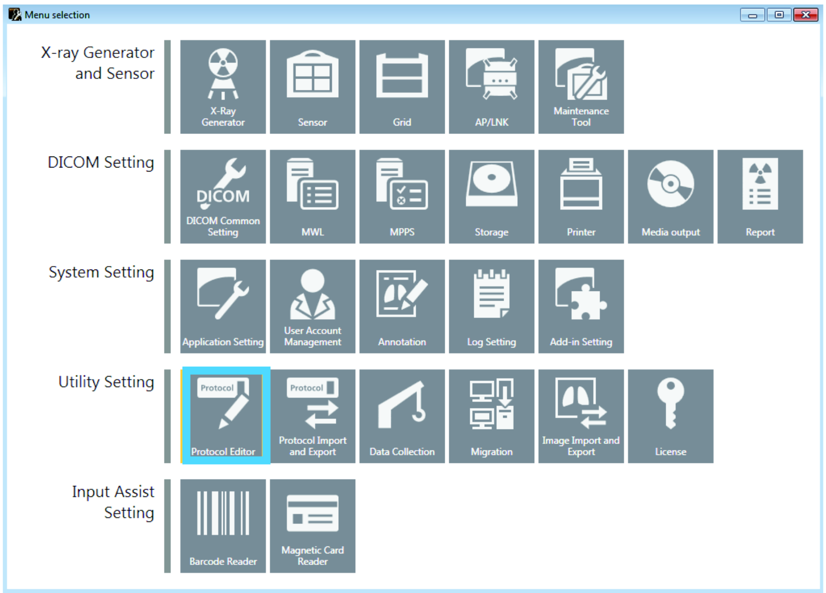
See also needed settings in step **6.**

Note!

Settings for `SID on` are not used.

5.3 Stitching (option)

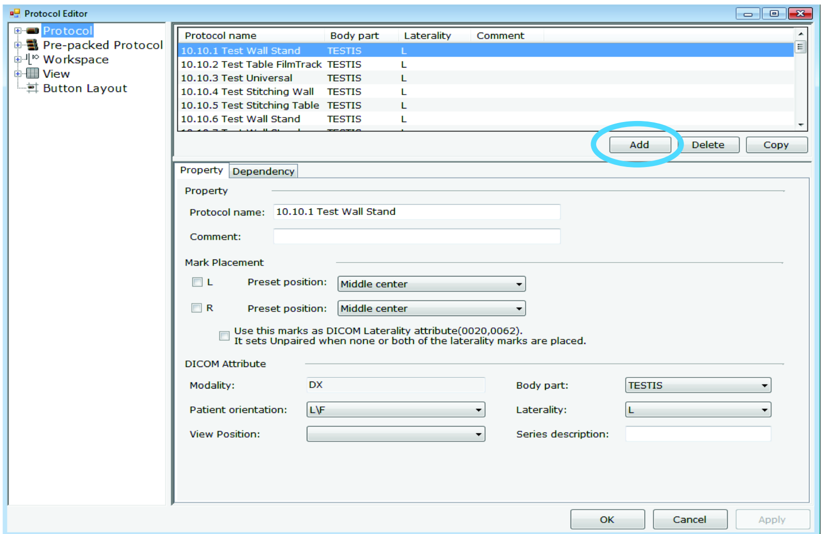
5.3.1 Stitching Protocol Definition



3646

Fig. 5-17

1. Enter Canon ServiceTool.
2. Select *Utility Setting/Protocol Editor*.



3516

Fig. 5-18

3. Select `Add` to define a stitching protocol.

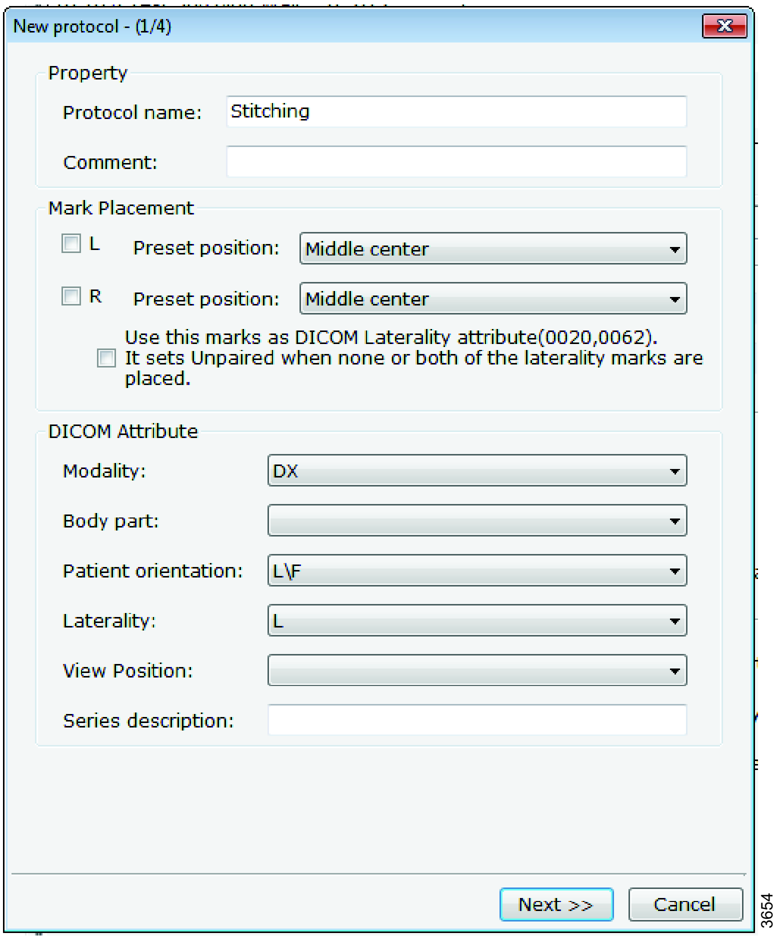
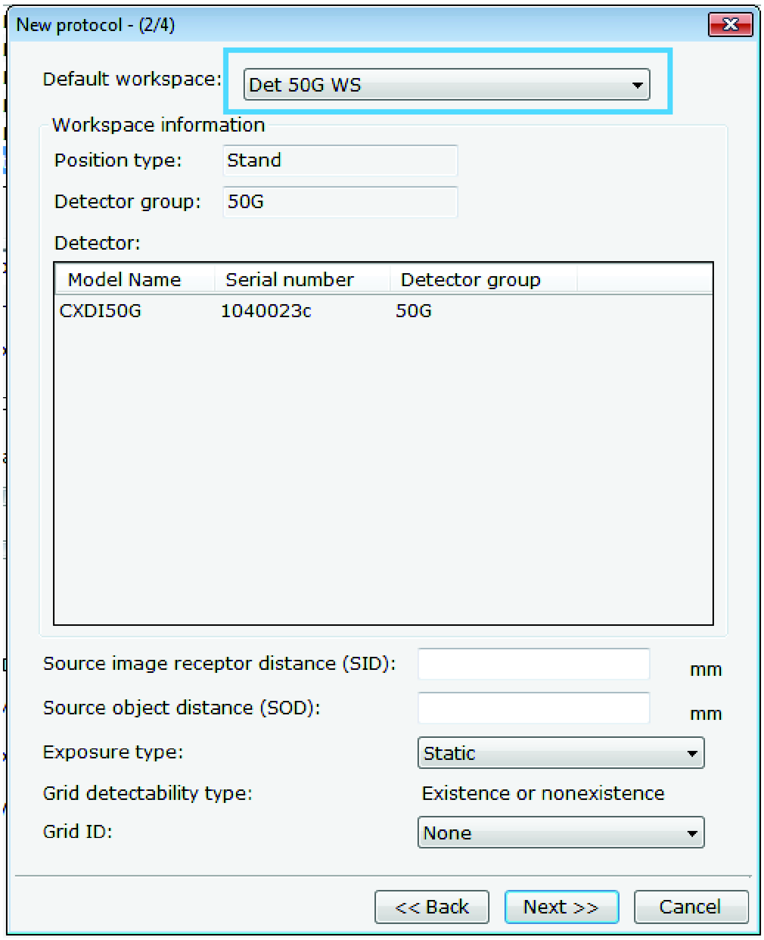


Fig. 5-19 New Protocol page 1

4. Type Stitching as `Protocol name`



3654

Fig. 5-20 New Protocol page 2 - Default workspace

5. Select wallstand as `Default workspace`.

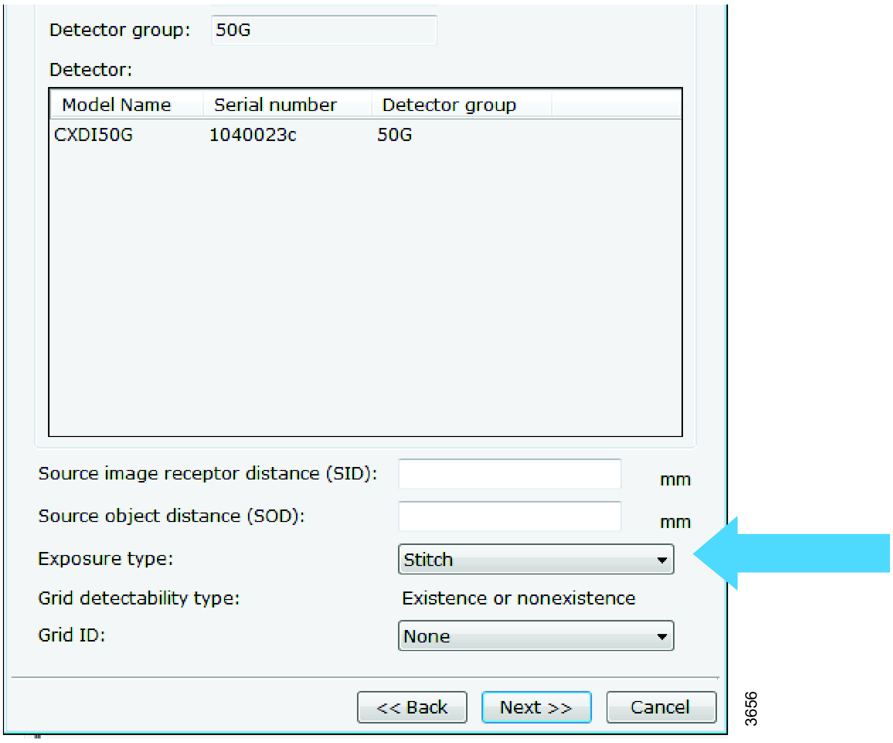


Fig. 5-21 New Protocol page 3 – Exposure type/Stitch

6. Select `Stitch` as `Exposure type`.

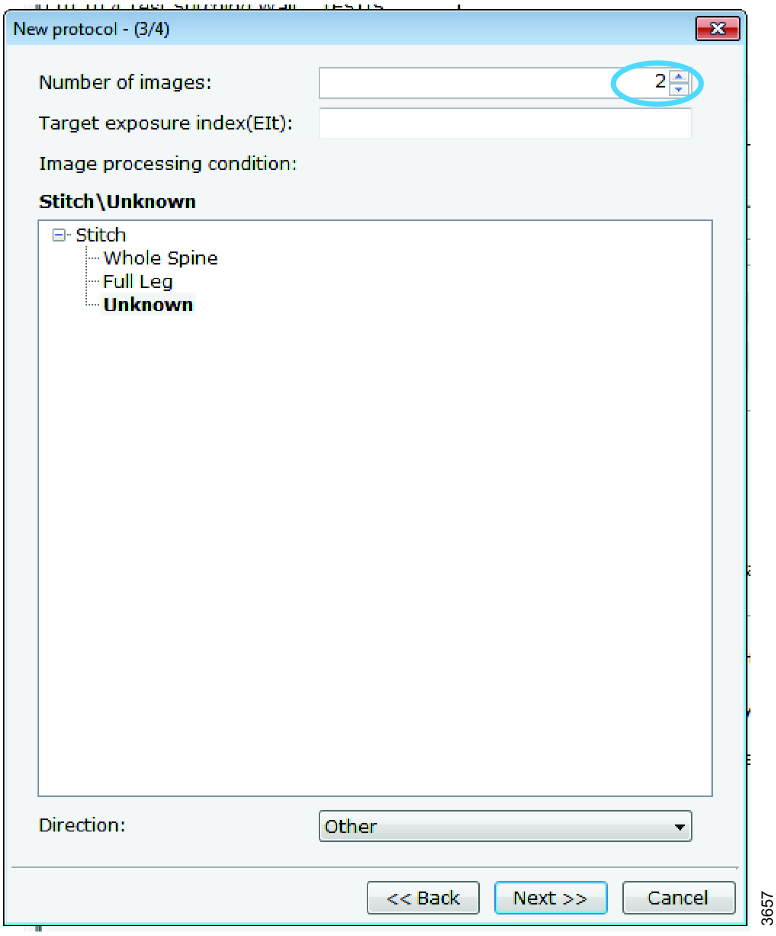


Fig. 5-22 New Protocol page 3 – Number of images

7. Define `Number of images` to be included in the stitching sequence.

   It is better to define one image more than expected than too few images. Based on the size of the region of interest, the system calculates the number of images needed and removes the protocols for images that are not exposed.

   A stitching protocol is now defined containing the number of protocols (Radiography) corresponding to the selected number of images.

   Exposure values shall be defined for all included protocols/images.

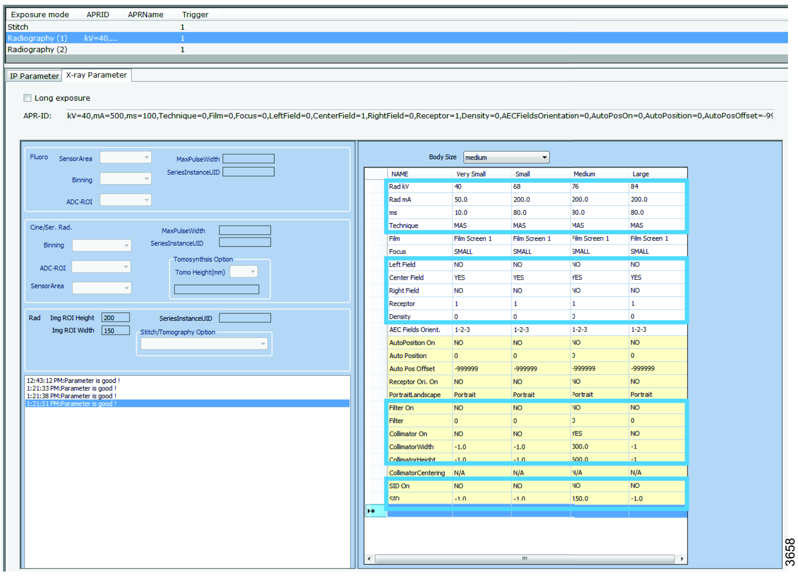
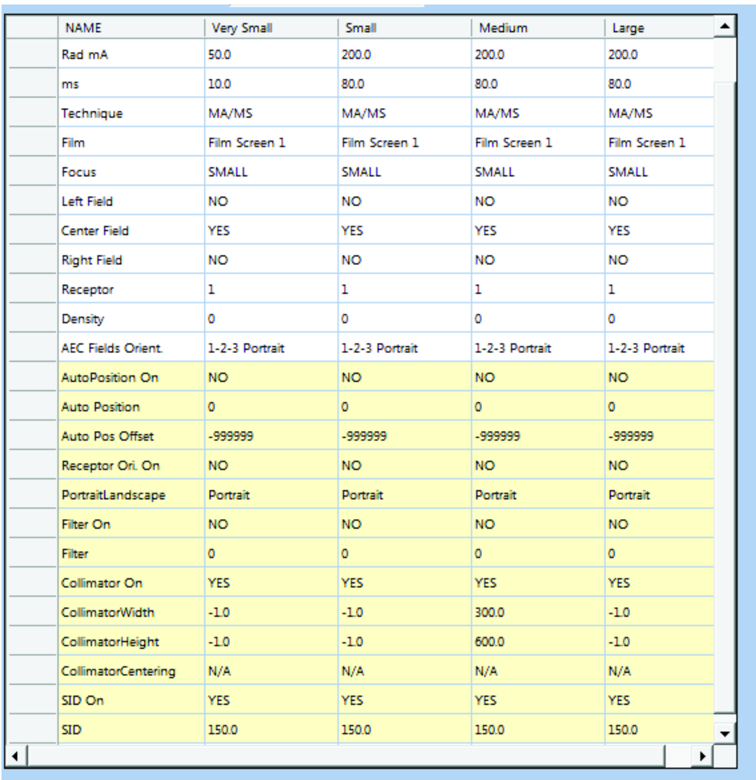


Fig. 5-23 Used parameters in Intuition system

8. Define exposure parameters for the first protocol/image.



NAME	Very Small	Small	Medium	Large
Rad mA	50.0	200.0	200.0	200.0
ms	10.0	80.0	80.0	80.0
Technique	MA/MS	MA/MS	MA/MS	MA/MS
Film	Film Screen 1	Film Screen 1	Film Screen 1	Film Screen 1
Focus	SMALL	SMALL	SMALL	SMALL
Left Field	NO	NO	NO	NO
Center Field	YES	YES	YES	YES
Right Field	NO	NO	NO	NO
Receptor	1	1	1	1
Density	0	0	0	0
AEC Fields Orient.	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait
AutoPosition On	NO	NO	NO	NO
Auto Position	0	0	0	0
Auto Pos Offset	-999999	-999999	-999999	-999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	NO	NO	NO	NO
Filter	0	0	0	0
Collimator On	YES	YES	YES	YES
CollimatorWidth	-1.0	-1.0	300.0	-1.0
CollimatorHeight	-1.0	-1.0	600.0	-1.0
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	YES	YES	YES	YES
SID	150.0	150.0	150.0	150.0

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9. First protocol: Define exposure parameters as for a regular protocol.
   Set Collimator ON to Yes.
   Define width and the expected total length of the stitched image.
   Set SID ON to Yes and define the SID value.

NAME	Very Small	Small	Medium	Large
Rad kV	40	68	76	84
Rad mA	50.0	200.0	200.0	200.0
ms	10.0	80.0	80.0	80.0
Technique	MA/MS	MA/MS	MA/MS	MA/MS
Film	Film Screen 1	Film Screen 1	Film Screen 1	Film Screen 1
Focus	SMALL	SMALL	SMALL	SMALL
Left Field	NO	NO	NO	NO
Center Field	YES	YES	YES	YES
Right Field	NO	NO	NO	NO
Receptor	1	1	1	1
Density	0	0	0	0
AEC Fields Orient.	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait
AutoPosition On	NO	NO	NO	NO
Auto Position	0	0	0	0
Auto Pos Offset	-999999	-999999	-999999	-999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	NO	NO	NO	NO
Filter	0	0	0	0
Collimator On	NO	NO	NO	NO
CollimatorWidth	-1.0	-1.0	-1.0	-1.0
CollimatorHeight	-1.0	-1.0	-1.0	-1.0
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	NO	NO	NO	NO
SID	-1.0	-1.0	-1.0	-1.0

3630

Fig. 5-24

10. For the second and third image the Collimator ON shall be set to Yes. The SID ON shall be set to NO and no SID value shall be defined.

6 Maintenance

For service issues or questions about the system maintenance, call your local service contractor.

6.1 General

WARNING!

Before working with service and maintenance that does not require power: Turn off the power and lock the main switch.

WARNING!

High voltage!

Risk of serious personal injury or death!

Only trained service technicians may install, service and maintain the system.

No unauthorized personnel may remove any covers.

WARNING!

Risk of electrical shock.

If covers are removed, live parts are exposed.

WARNING!

Squeezing hazard can occur between the vertical lift segments when moving in Z-direction.

WARNING!

Reduced safety when intentionally disabling a safety mechanism.

WARNING!

Remaining energy may exist when the equipment is switched off.

Wait at least 15 seconds before working on the system.

WARNING!

Be aware of possible squeezing hazards when the covers are removed.

CAUTION!

Use gloves when in contact with grease.

Note!

For maintenance of components attached to the system (tube, generator, collimator etc.), refer to chapter 1 and System documentation.

This chapter contains the instructions necessary for annual maintenance:

- Alignments and settings
- Preventive maintenance
- Performance testing

To guarantee the safety of the patient and to ensure the functions and availability, the operator and third parties shall follow the instructions in this chapter.

If any malfunction is detected, the entire equipment must be taken out of use until the malfunction is eliminated or usage of the system is approved by a service engineer from the supplier or by the local technical staff trained by the supplier.

The Manufacturer recommends use of the **15 Appendix B, Page 543**.

Annual checks shall be performed either by local technical staff trained by the supplied or authorized service representatives.

Daily and monthly checks are normally performed by the user/operator and is found in the Operation Manual.

6.2 System

1. Measure the system protective earth.
   See **4.17 Measure Protective Earth, Page 175**.
2. Check the emergency stops.
   See **2.11 Emergency Stop, Page 25**.

6.3 OTC

1. Check the tightening of bolts fixing the Y-rails to the Unistrut rails.
   Tightening torque 24 Nm.

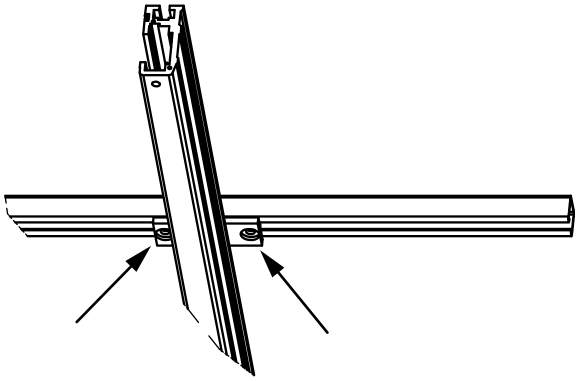


Fig. 6-1

2. Check the tightening of bolts fixing the X-rails distance plates (total 12 screws).
   Tightening torque 24 Nm.

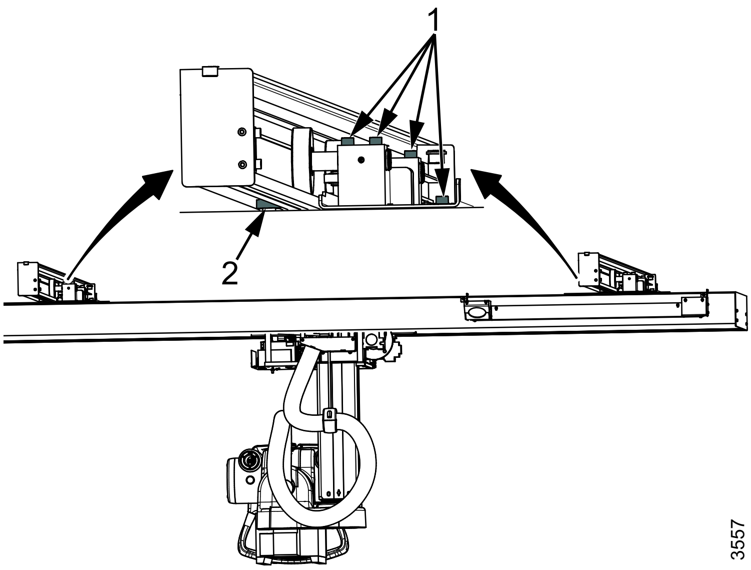


Fig. 6-2

1. *Screws*
2. *Side position wheel*

3. Clean the side position wheels and check for damage.

4. Check the tightening of screws for the X-ray tube turning plate.
   a Remove the screws holding the cover (1) under the column.
   b Lift the cover.
   c Check that there is no play between the top column (3) and the rotation unit (4).
   d Check the tightening of the 4 screws (2). Tightening torque 24 Nm.

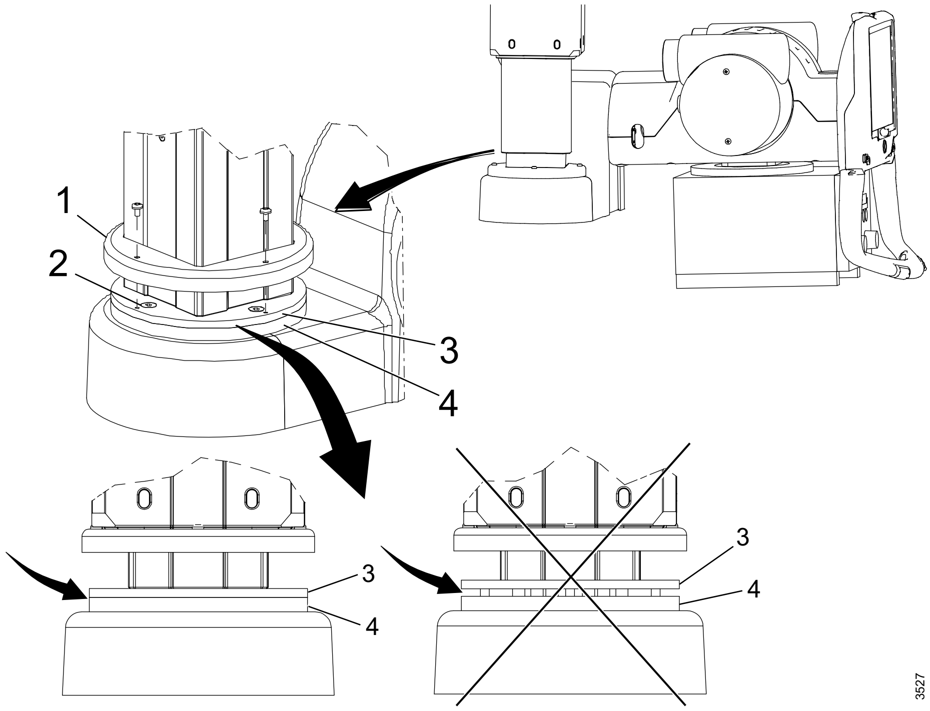


Fig. 6-3

1. *Cover*
2. *Screw*
3. *Top column*
4. *Rotation unit*

5. Check the lifting cord for damage and make sure it runs smoothly.
   Change the lifting cord if the tension is too low.

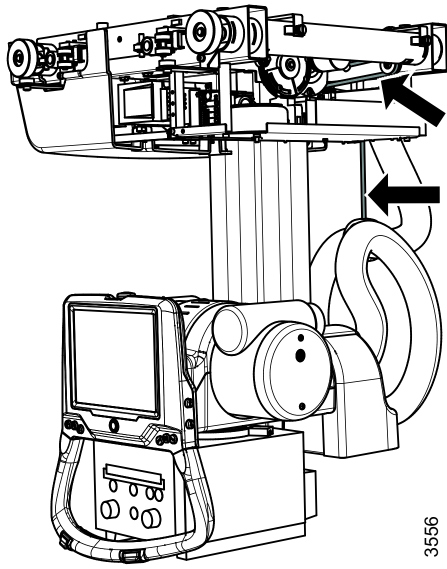


Fig. 6-4

6. Check the safety switch in the column.
   a Drive the table to the upper end stop.
   b Position the OTC column 10 mm above the table top.
   c Put protection cardboard between the OTC and the table top.
   d Drive the OTC into the table top, the OTC shall stop. It shall not be possible to drive up or down.
   e Drive the table to the low end stop.
   f The OTC shall be able to drive up and down.

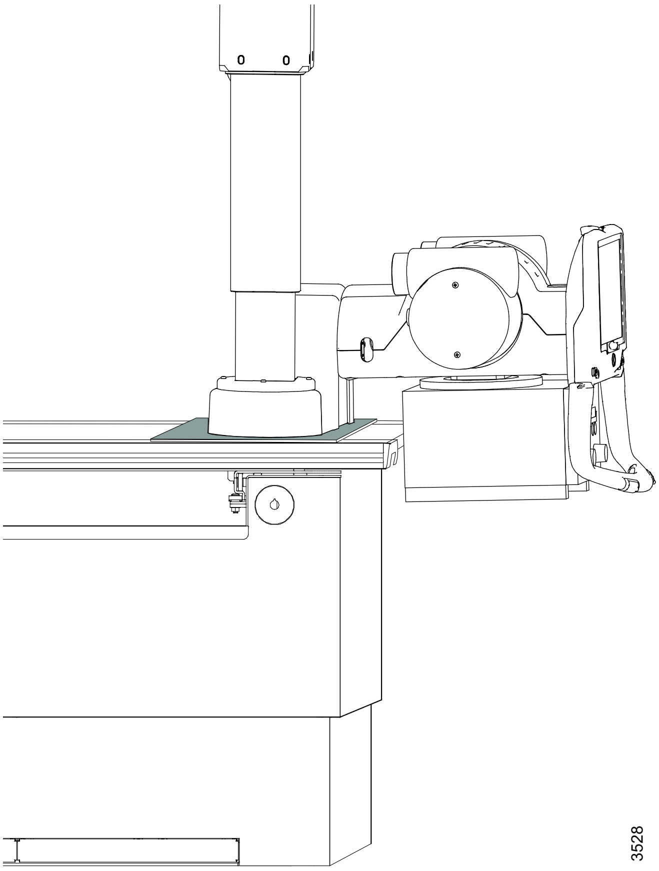


Fig. 6-5

7. Check the alignment of the X-ray and light field.
   See **4.34.2 Collimator Light and X-Ray Field Alignment, Page 220**.
8. Check the alignment of the OTC.
   See **4.20 Alignment of OTC, Page 193**.
9. Check the tube angulation.
   See **4.38.5 OTC Alpha Calibration, Page 253**.
10. Check the tightening of the four X-ray clamp screws.
    Tightening torque 24 Nm.

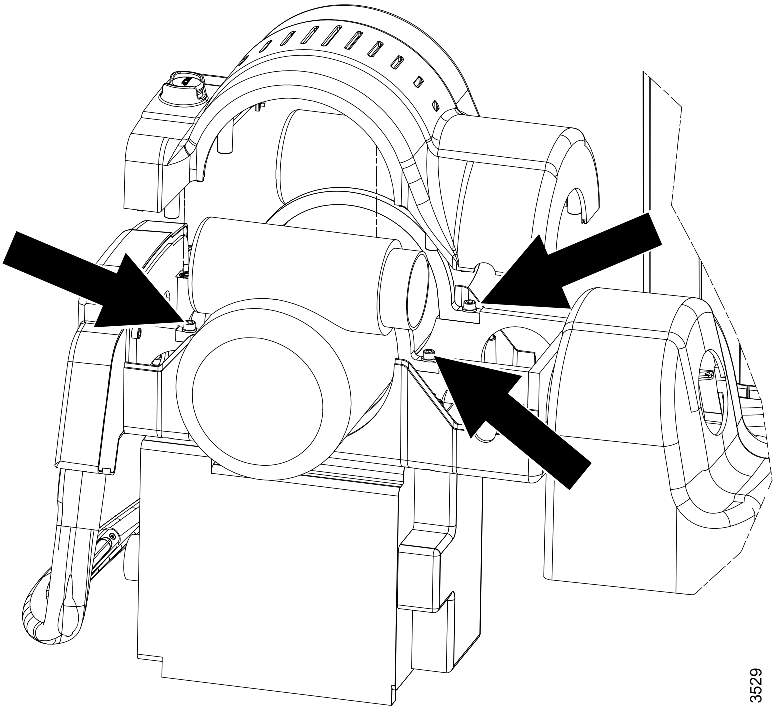


Fig. 6-6

11. Check the X-ray tube for oil leakage.
12. Check that there is no play between the collimator and the X-ray tube.
    If there is a play, tighten the three screws.
    Adjust the collimator index position.

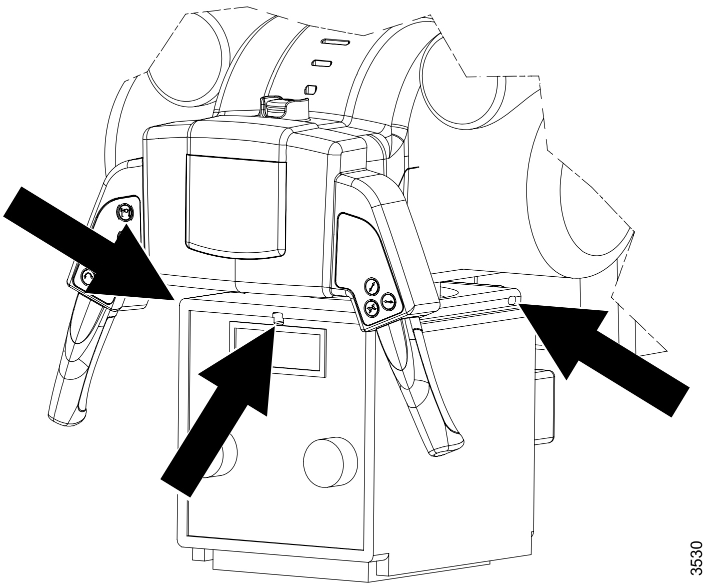


Fig. 6-7

13. Check the function of the column Z contactor.
    a Drive the column in Z-direction, up or down.
    b The contactor should be activated and when the movement stops the contactor must release.

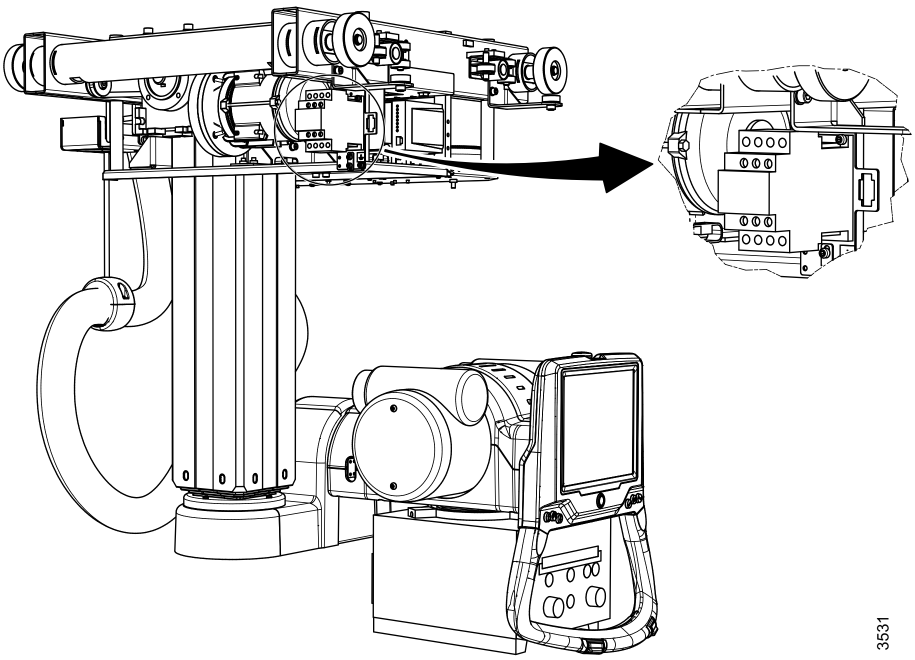


Fig. 6-8

14. Check the function of the manoeuvre handle buttons.
    The buttons should not be damaged or get stuck when pressed.
15. Check the function of the column Z brake.
    a Drive the column in Z-direction up or down.
    b The brake shall release under the movement and lock when the movement stops.

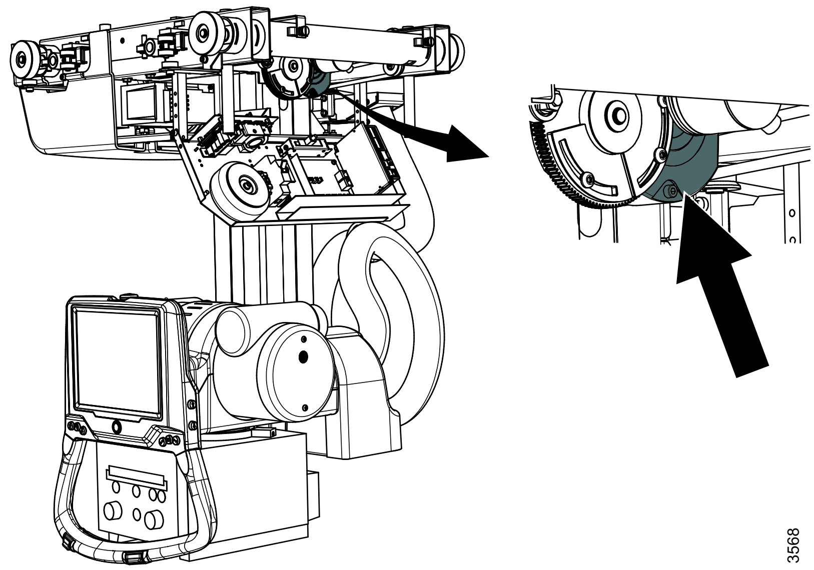


Fig. 6-9

16. Check the OTC column segments (full stroke).
    The column segments should run smoothly without noise.
    If necessary, lubricate the columns with Castrol Alpha SP 220.
17. Clean the wheel tracks.

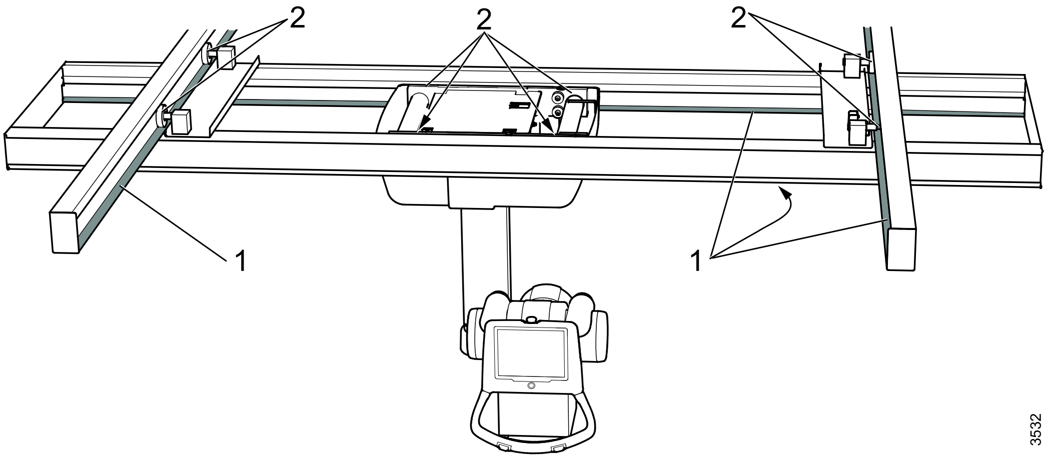


Fig. 6-10

1. *Wheel tracks*
2. *Wheels*

18. Clean the wheels.
19. Check the fastening of the OTC column.
    Tightening torque 24 Nm.

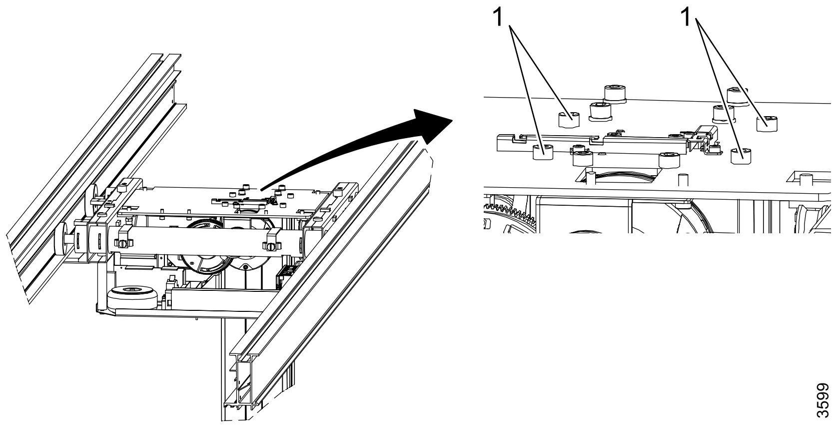


Fig. 6-11

1. *Screws*

20. Check the fastening of the OTC wagon side position wheel.
    Tightening torque 24 Nm.
    Clean the side position wheel and check the condition.
    Check the position of the clamp ring and the safety clamp ring.

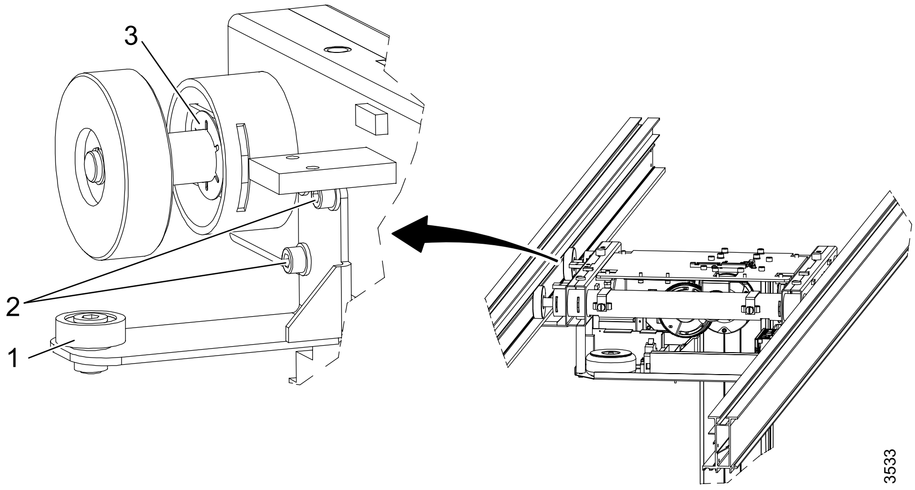


Fig. 6-12

1. *Side position bearing*
2. *Screws*
3. *Clamp ring and safety clamp ring*

21. Check the movement of the OTC to all positions in X-, Y- and Z-directions.
    The OTC should run smoothly without noise.

6.4 Closed Table

1. Check the tightening of bolts fixing the table to the floor.
   Tightening torque 25 Nm.
   a Remove the covers, see **4.12.1.2 Remove Covers, Page 160**.
   b Move the safety clamp to the service performance position, see **Fig. 4-123**.
2. Check the function and clean the table top ball bearings.
   a Remove the table top, see **4.27.1 Closed Table, Page 209**.
   b The ball bearings shall be secured to the table and run smoothly.
3. Clean the table top profiles.

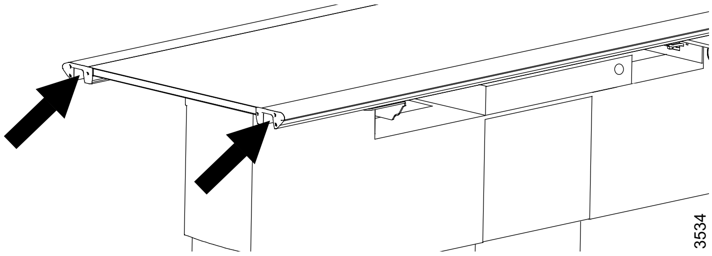


Fig. 6-13

4. Clean the profiles for the image receptor tray and detector wagon wheels.

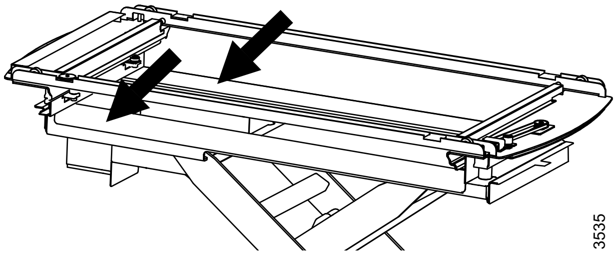


Fig. 6-14

5. Check the table top brake cabling.
   Check the condition of the cables and the cabling should be tied with cable ties.

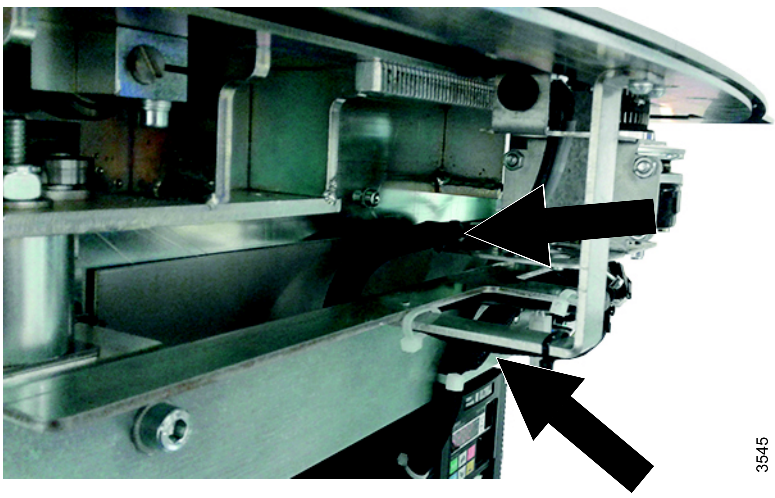


Fig. 6-15

6. Check the X-Y function of the table top brake.
   a Install the table top, see **4.27.1 Closed Table, Page 209**.
   b Release the table top brakes and place a dynamometer against the table top and push slowly.
   The table top should run smoothly in X- or Y-direction, it must be possible to move the table top with a force under 10 N.
   c Lock the brakes and place a dynamometer against the table top and push slowly.
   No movement of the table top using a force under
   X-direction < 250 N
   Y-direction < 300 N
   Turn off the power to the system and the table top shall be locked.
7. Check the internal Z movement cabling.
   The cabling should be tied with cable ties.

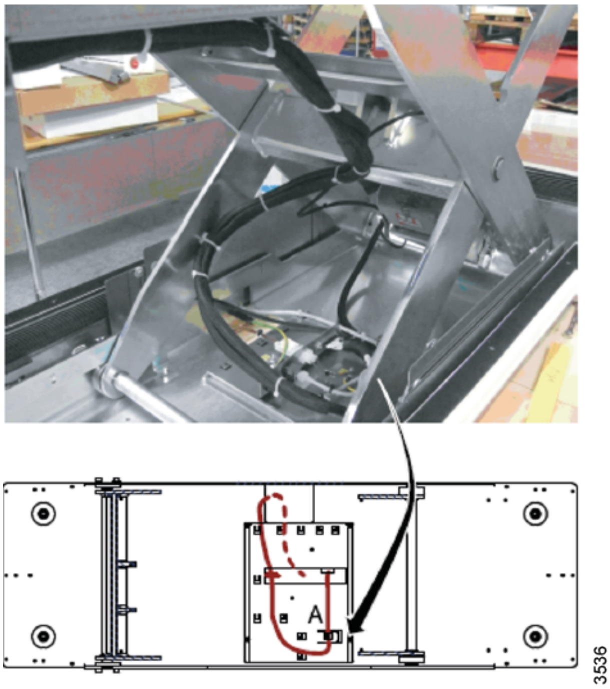


Fig. 6-16

8. Check the status of the critical circlips.
9. Check the status of the sliding bearings.
10. Check the fastening of the mechanical stops of the lifting unit.
    Tightening torque 25 Nm.

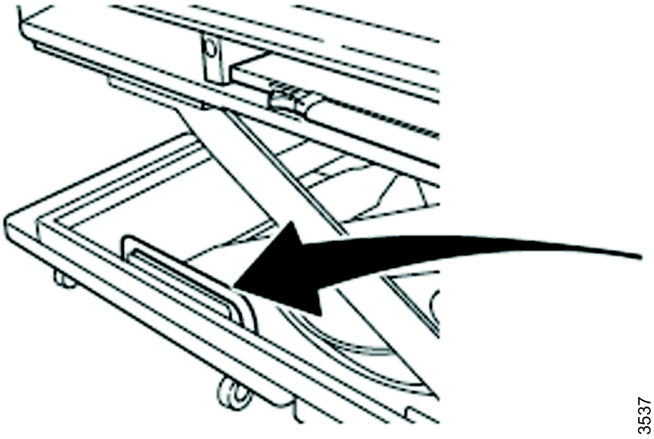


Fig. 6-17

11. Lubricate the Z-screw of the lifting unit.
    Use grease Klüber Duotempi PMY45.
    Use a brush to apply the grease.
    Order the grease from the manufacturer.
12. Check for oil leakage from the lifting unit gearbox.
13. Check the Z function of the table.
    a Move the safety clamp to the operation position (parking position), see **Fig. 4-123**.
    b Install the covers, see **4.12.1.2 Remove Covers, Page 160**.
    c Drive a full stroke in Z-direction.
    d The table should run smoothly without noise.
14. Check the table guard function.
    Drive the table downwards, lift and hold the table top.
    The guard function will stop the table movement.
    Repeat the test at the other side of the table top.
15. Check the foot and hand control X/Y/Z buttons.
    The buttons should not be damaged or get stuck when pressed.

6.5 Two Column Table (option)

1. Check the tightening of bolts fixing the table to the floor.
   Tightening torque 25 Nm.
2. Check the function and clean the table top ball bearings.
   Remove the table top, see **4.27.2 Two Column Table (Option), Page 211**.
   The ball bearings shall be secured to the table and run smoothly.
3. Clean the table top profiles.

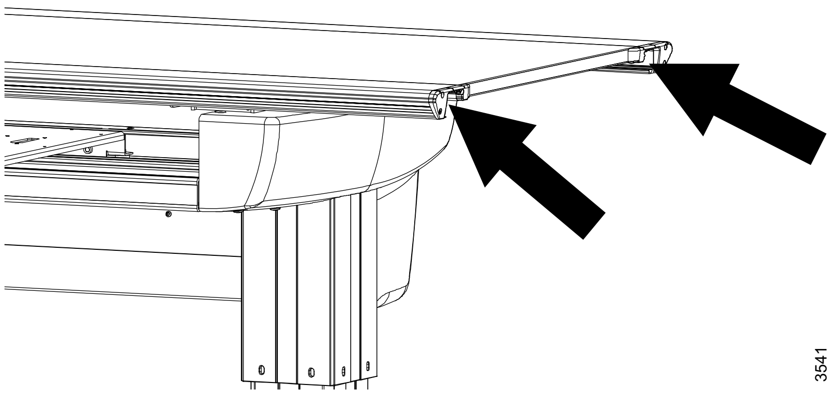


Fig. 6-18

4. Clean the profiles for the image receptor tray and detector wagon wheels.

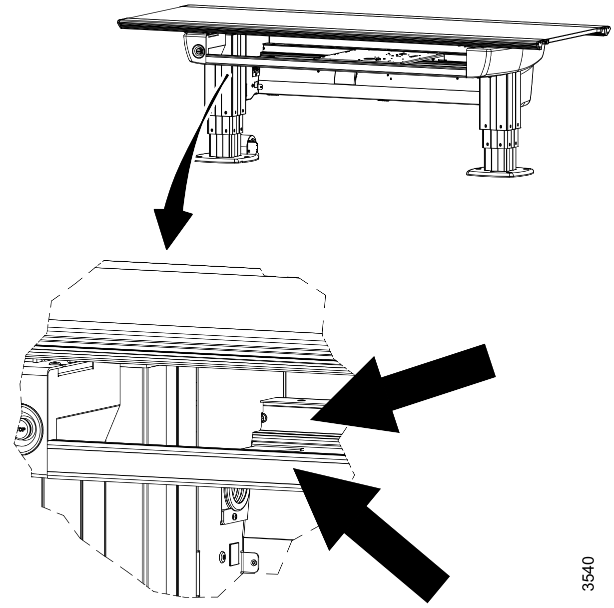


Fig. 6-19

5. Check the cabling to the table top brakes.
   Remove the cover.
   Check the condition of the cables and the cable chain. Replace if necessary.

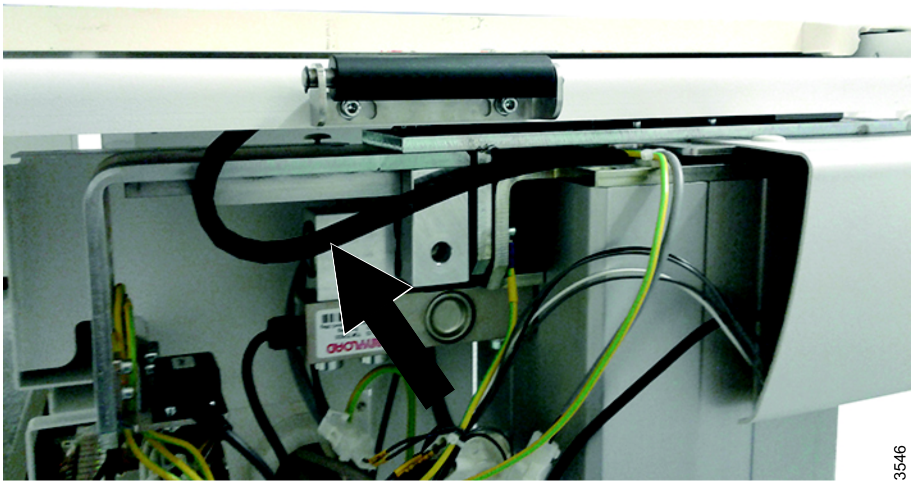


Fig. 6-20

6. Check the condition of the table top brake pads.
7. Check the X-Y function of the table top brakes.
   a Install the table top, see **4.27.2 Two Column Table (Option), Page 211**.
   b Release the table top brakes and place a dynamometer against the table top and push slowly.
   The table top should run smoothly in X- or Y-direction, it must be possible to move the table top with a force under 30 N.
   c Lock the brakes and place a dynamometer against the table top and push slowly.
   No movement of the table top using a force under
   X-direction < 200 N
   Y-direction < 300 N
   Turn off the power to the system and the table top shall be locked.
   Adjust the brakes if necessary, see **6.5.1 Y-Brakes, Adjustment, Page 324** and **6.5.2 X-Brakes, Adjustment, Page 326**.
8. Check the column segments on the table (full stroke).
   The column segments should run smoothly without noise.
   Lubricate the columns if necessary.
   Use grease Castrol Alpha SP 220.
9. Check the buttons on the foot control X/Y/Z.
   The buttons should not be damaged or get stuck when pressed.
10. Check the table guard function (option).
   a Fix a dynamometer to the table top.
   b Lower the table.
   c The guard function should activate when the force exceeds 200 N +/-70 N.

6.5.1 Y-Brakes, Adjustment

Adjust the brake plate:
1. Release one or both of the bolts.
2. Adjust the brake plate up or down.
   - The brake plate should be aligned (A) with the brake unit.
   - The wheel must be in contact with the brake plate.

When the distance between the brake unit and the brake plate is correct – the spring underneath the brake unit will lift up the brake unit. The small gap (approx. 1 mm) ensures the brake to work correctly.

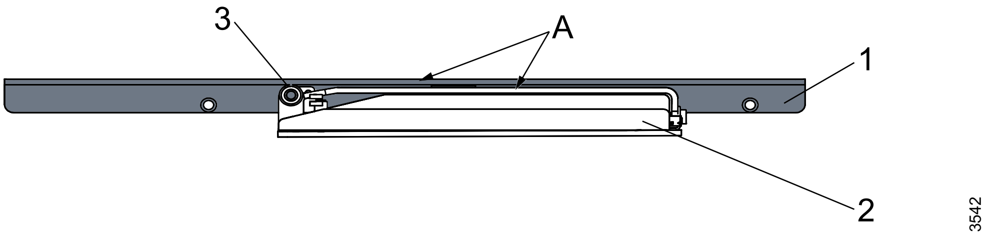


Fig. 6-21

1. *Brake plate*
2. *Brake unit*
3. *Wheel*

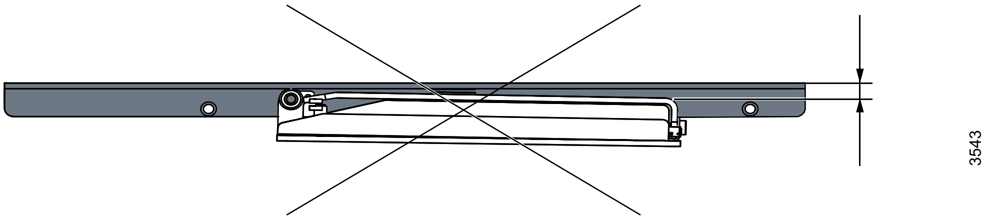


Fig. 6-22

The brake force is depending on the distance between the magnets and the brake plate.

6.5.1.1 Low Brake Force or Brake Release Problems

Larger distance in the rear end than in the front end will reduce the braking force.

The general distance between the brake unit and the brake plate is too large

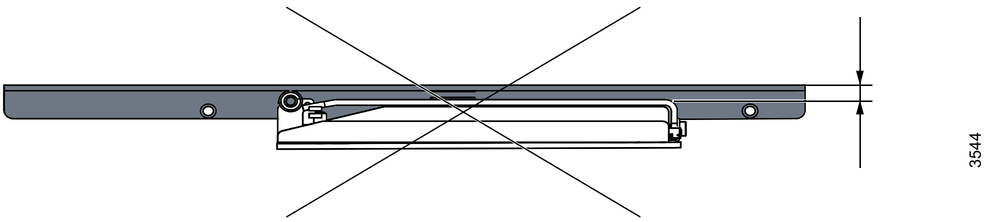


Fig. 6-23

If the brake unit does not releases correctly and get stuck, adjust the distance:

1. Align the brake unit and the brake plate when the magnets are active (i.e. the brake is released).
2. Make sure the gap is approx. 1 mm underneath the brake unit.

6.5.1.2 High Brake Force

Larger distance in the front end than in the rear end will increase the braking force.

The general distance between the brake unit and the brake plate is too small.

The table top tends to jam when the brake unit is released.

1. Align the brake unit and the brake plate when the magnets are active (i.e. the brake is released).
2. Make sure the gap is approx. 1 mm underneath the brake unit.

6.5.2 X-Brakes, Adjustment

The brake force is depending on the distance between the magnets and the brake bar.

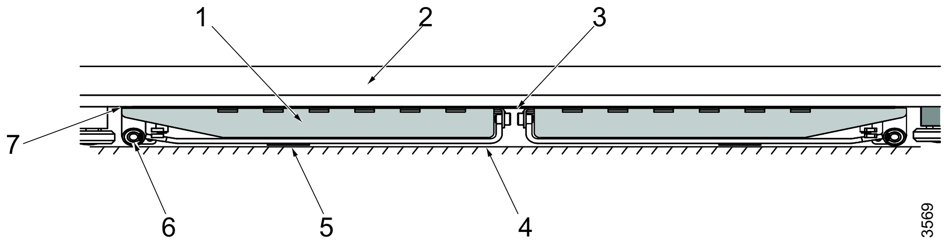


Fig. 6-24

1. *Brake unit*
2. *Table top frame*
3. *Shim*
4. *Table top profile*
5. *Brake Lining*
6. *Wheel*
7. *Distance between the brake unit and the table top*

6.5.2.1 Low Brake Force or Brake Release Problems

Larger distance in the rear end than in the front end will reduce the braking force.

The general distance between the brake unit and the brake plate is too large

If the brake unit does not releases correctly and get stuck:

1. Add another shim underneath the brake unit.
2. Make sure the gap is approx. 1 mm underneath the brake unit.

6.5.2.2 High Brake Force

Larger distance in the front end than in the rear end will increase the braking force.

The general distance between the brake unit and the brake plate is too small.

The table top tends to jam when the brake unit is released.

1. If the brake releases correctly, the distance between the brake unit and the table top profile is too small.

   Remove shim from underneath the brake unit to increase the distance.
2. If the brake doesn’t release correctly the distance is too big

   Add shims to the brake.

6.6 Wallstand

1. Check the tightening of bolts fixing the wallstand to the floor.
   Tightening torque 15 Nm.
2. Check the Z-chain attachment.
   a Remove the front, back and top cover, see **4.10.5 Remove Back Cover, Page 148**.
   b Check the chain locks A and B.
   c Check the circlips at the fastening of the axis C.

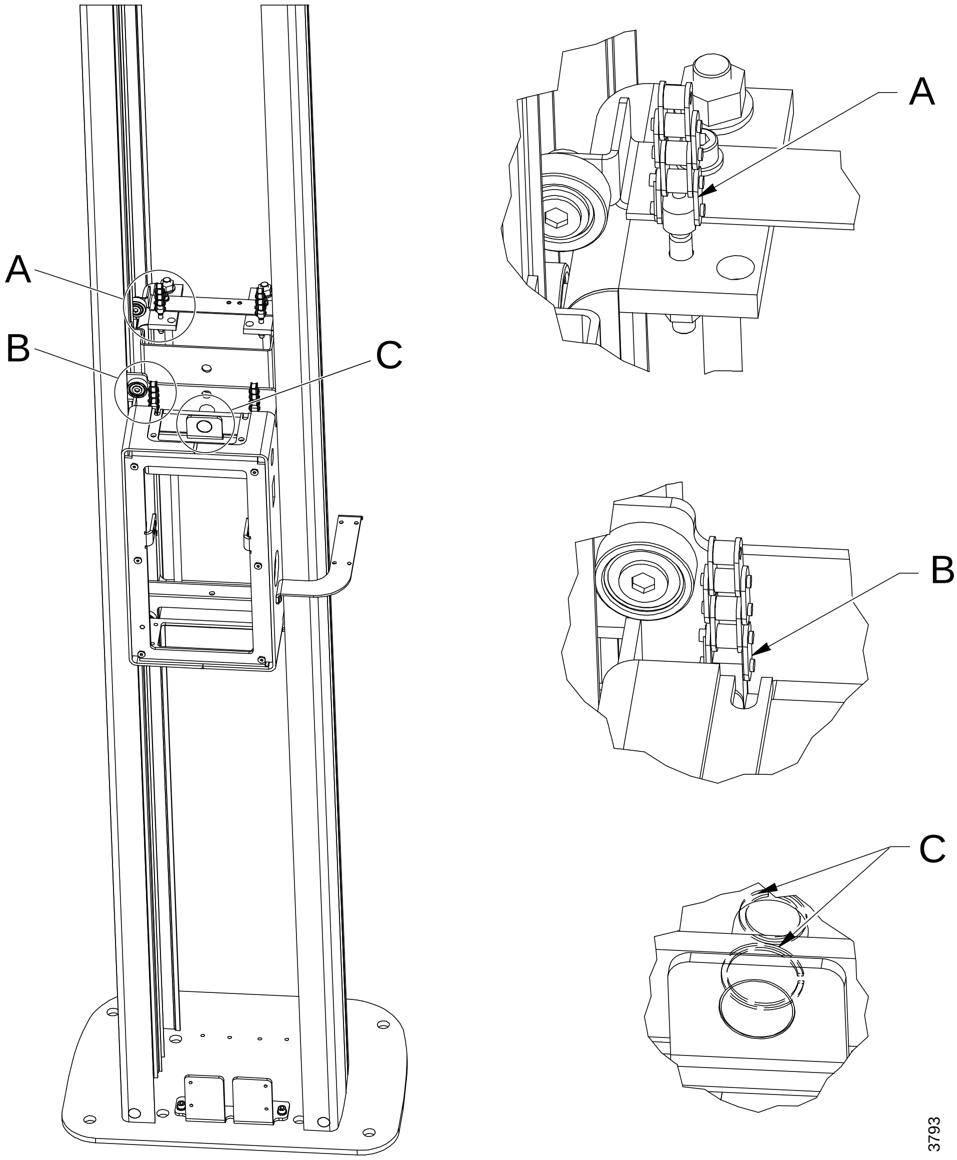


Fig. 6-25

3. Check the Z movement.
   The lift mechanism should be balanced and run smoothly without noise.
4. Check the Z-mechanical end stops.
   a Check the position and condition of the end stops.
   There are four end stops, two at the top and two at the bottom of the column.
5. Check the function of the Z-brake.

- a Lock the Z-brake and place a dynamometer against the detector wagon and push slowly.

  No movement of the detector wagon using a force under 200 N.
- b The detector wagon should run smoothly when the brake is released.

6. Check the buttons on the foot control X/Y/Z.

   The buttons should not be damaged or get stuck when pressed.

6.6.1 Tiltable Wagon (option)

7. Check the function of the detector tilt.
   - a Position the detector in horizontal position.
   - b Lock the tilt brake and place a dynamometer against the detector wagon and push slowly.

     Do not push on the detector holder cover.

     No movement of the detector wagon using a force under 50 N.
   - c The detector wagon should tilt smoothly when the brake is released.
   - d Check the condition of the end stops.

     The detector wagon has two end stops.

6.7 System Part 2

1. Check the synchronization circuit.
   a Press the synchronization control (1) on the wallstand. The diode D17 (2) on 1.5SBB01 shall light up.
   The diode shall not light up when the synchronization control is deactivated.

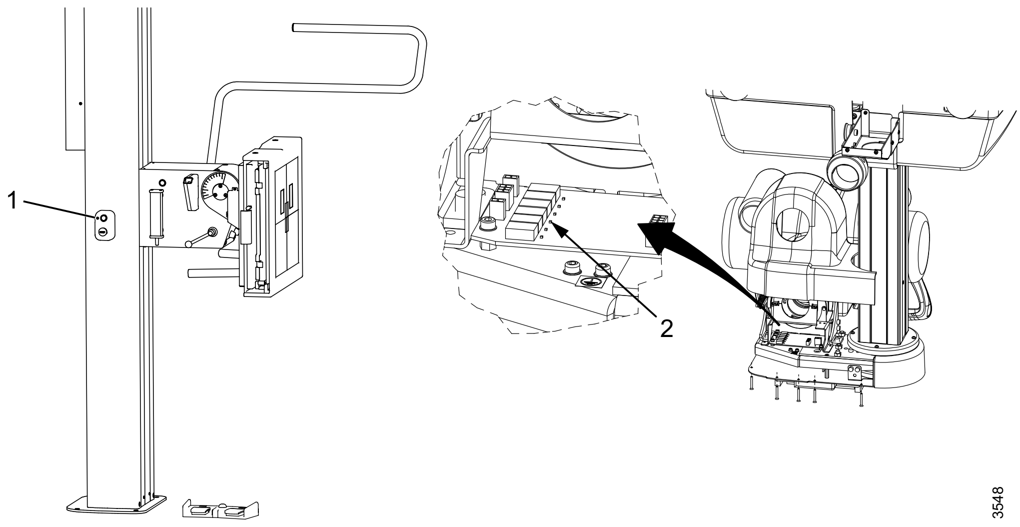


Fig. 6-26

   b Press the foot pedal (if present), the diode D17 (2) on 1.5SBB01 shall light up.
   The diode shall not light up when the foot pedal is deactivated.
2. Check the Z safety zone.
   Drive the OTC and wallstand detector upwards as high as possible.
   a Point the tube towards the detector at the wallstand.
   b Activate the wallstand tracking and sync the OTC with the wallstand detector (confirm that the servo light is permanent on).
   c Move the detector to the lowest position and the OTC shall follow the wallstand the whole stroke.
   Deactivate wallstand tracking and point the tube towards the floor.
   a Position the OTC over the table.
   b Position the table top 700 mm over the floor.
   c Activate the table tracking and sync the OTC with the table (confirm that the servo light is permanent on).
   d Drive the OTC to SID 100, servo light is flashing.
   e Drive the table downwards and the OTC shall follow the table and stop 1240 mm over the floor (the OTC Z safety height).

3. Check the positioning index of the OTC.
   See **4.37 Install Positioning Index (option), Page 241**.
4. Check the table detector signals.
   Activate the table tracking.

- No detector present
  Remove the detector and slide in the detector holder tray.

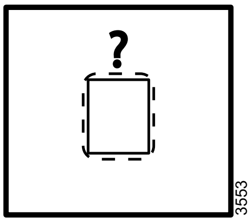


Fig. 6-27 No detector present

- Detector present
  Insert a detector and slide in the detector holder tray.

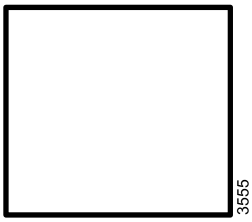


Fig. 6-28 Detector present

- Tray out of position (rotated)
  Push/rotate the detector out of position when it is in the detector holder.

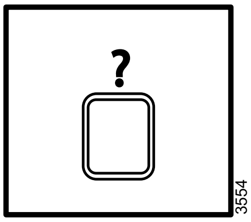


Fig. 6-29 Tray out of position

- Tray out of position
  Pull out the detector tray from the detector holder.

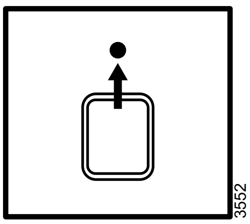


Fig. 6-30 Tray out of position

5. Check the wallstand detector signals.
   Activate the wallstand tracking.

- No detector present
  Remove the detector and slide in the detector holder tray.

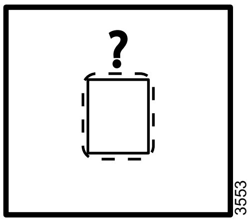


Fig. 6-31 No detector present

- Detector present
  Insert a detector and slide in the detector holder tray.

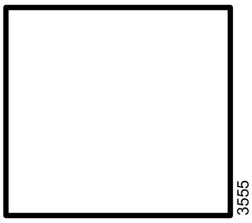


Fig. 6-32 Detector present

- Tray out of position (rotated)
  Push/rotate the detector out of position when it is in the detector holder.

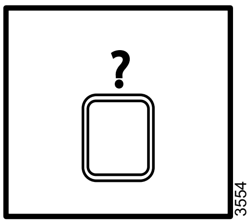


Fig. 6-33 Tray out of position

- Tray out of position
  Pull out the detector tray from the detector holder.

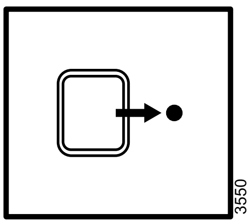


Fig. 6-34 Tray out of position

6. Check the table SID.
   a Activate the table tracking and sync the system (confirm that the servo light is on).
   b Measure between the X-ray tube focal spot and the active image receptor surface of the detector.
   c The measured SID shall correspond with the displayed SID.
   The SID must not differ more than ±1%.

7. Check the indication light and collimator light.
   See **4.41 Check Indication Light and Collimator Light, Page 288**.
8. Check the function of the AEC chamber.
   See **4.39 AEC Calibration, Page 270**.
   Calibrate if necessary.
9. Verify the measured DAP value (Area dose:dGycm2).
   a Measure the value with a dos meter.
   b Calculate the dap value.
   c Compare the calculated value to the image system value.
10. Clean all outer surfaces.
11. Disconnect the power plug and wipe off dust and dirt with a dry cloth.
12. Check all outer cables for damage.
13. Make sure the Operation manual is available and up to date.

6.8 Software Version/Update

There are different software systems in the product.

1. Generator
2. Cabinet
3. Overhead tube support
4. Table
5. Wallstand

   The software can be updated as described in the upgrade instructions, attached to the update document.

6.8.1 The Software and its Update Location Point

The software is physically located according to the table below:

	System software	Connection point for software upload*	Upgrade instructions (UDI)
1.	Cabinet	See upgrade instruction.	SwUDI_0180–4C_x_y_z.pdf
2.	Overhead tube support	See upgrade instruction.	SwUDI_0180–4C_x_y_z.pdf
3.	Table	See upgrade instruction.	SwRLN_0055_x_y_z-.pdf SwUDI_0180–4C_x_y_z.pdf and SwRLN_0181_x_y_Z.pdf
4.	Wallstand	See upgrade instruction.	SwUDI_0180–4C_x_y_z.pdf

7 Diagnostic

7.1 General

The OTC display will show error messages in case of fault.

7.1.1 Error Handling Two Column Table (option)

A node is always in a specified state. When all nodes are working correctly and no errors have been detected the system, and the nodes, are in the ENABLE state. It is only possible to perform active commands in this state, if a node is in some other state is it only possible to request information from a node. As soon as a problem is detected the node changes it´s internal state. In the system two different error states are specified; one that it's possible to recover from (ERROR) and one that is not (UNRECOVERABLE ERROR). One special state is the DISABLE state that is used to force a node to not perform any active commands. It is possible to change to ENABLE state with just one command, for example in case of an emergency stop button pressed.

It is also possible to check state of the node via the led-indication on the control board of the node. The CB-board have a number of diodes (led) that are used as indication on different states and events in the system, following is a description on each diodes value.

Fig. 7-1 Placement of the diodes on the CB-board.

Diode 1	Diode 2	Node State	Priority
Off	Off	Enable	4 = Low
Off	On	Disable	3
On	Off	Startup/Init	2
On	On	NonRecoverableError/Error	2 = High

Diode 1 and 2 will indicate the node state.

Diode 3 shall toggle each time a message is received.

Diode 4 indicates that logic power exists.

The diode indication will always reflect the state priority for the physical node. A node that receives CAN messages for a number of nodes will indicate the state with the highest priority, for example if one logical node is in the enable state and the other is in the disable state shall the diodes show the disable state indication.

7.1.2 System Message Two Column Table (option)

7.1.2.1 General

If the action says "Contact dealer" shall the entire error messages be noted and given to dealer.

That a valid System software release is used can be checked by the service software, the release should be shown in the lower right corner of the service software. It may also be checked by comparing the node and service software version shown in the service software with the versions stated in the RVL_0055S_SW document.

7.1.2.2 Description

A System message consists of the following parts, Type, Node, Component, Reason and Extra. Where:

- Type, defines the severity of the system message. This may be information, warning or error.
- Node, the node that sent the system message.
- Component, the component that caused the error.
- Reason, the cause of the message.
- Extra, four bytes of extra information. These bytes are always sent, even with messages that don't have any extra information. The extra information is shown as up to 4 parts, with the following format: <part number>:<description>< number of bytes used.>.

Definitions

The following ids are used to identify the node in a system message.

IDs used to identify the different nodes in a system message

Node	Id
Master	1
Z1	2
Z2	3
Guard	4

7.1.2.3 All Nodes

Component Id 01, Software Error

Reason	Description and status of System	Extra	Corrective action
01, Default error	Internal Software error.	N.a.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02, Error Value	Internal Software error.	N.a.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 02, Base Node

Reason	Description and status of System	Extra	Corrective action
01, Watchdog timeout	The node has detected that a watchdog was not received in time.	1: Component. 1 byte. 2: Time-out time in ms. 2 bytes.	- Check that all nodes are functional. - Check tat the CAN bus cables are correctly connected.
02, Checksum error	The node has detected a checksum error in the parameter memory.	1: The calculated checksum. 1 byte. 2: Stored inverted checksum. 1 byte. 3: Stored checksum. 1 byte.	- Download the correct parameter file. - Change board.
03, Unknown command	The node has detected a CAN command that is not implemented in the node.	1: The unknown command. 1 byte. 2: Sender part of the CAN identifier. 2 bytes.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
04, Logic power low	The node has detected that the logic power is low.	Not used.	- Check the 24 V logic voltage, measure at the logic power connector to the board.

7.1.2.4 Motor Nodes

Definitions

The following collision types is defined.

Table 7-1 Description of the different collision types

Collision type	Description	Corrective action
1	Control error larger than specified by the "max position error" parameter.	- Remove any blocking obstacle. - Check the mechanics. - Check that the correct parameter file is used.
2	Time out, did not reach final position in time.	- Remove any blocking obstacle. - Check the mechanics. - Check that the correct parameter file is used.
3	No power, the power to the DC-board was switched off during a movement.	- Check the 36V power voltage (measure at the power connector to the DC-board). - Check the DC-board fuse.
4	Drive unit externally inhibited.	- Check that the voltage between J3:2-J3:6 and J3:3-J3:6 (on the DC-boards) are zero volts.
5	Position transducer has not moved, in spite that the output voltage has had an output voltage for a time. The voltage is specified in the "moved voltage" parameter and the time is specified in the "moved time" parameter.	- Remove any blocking obstacle. - Check the mechanics. - Check that the correct parameter file is used. - Check the potentiometer.

Component Id 03, Motor Node

Reason	Description and status of System	Extra	Corrective action
01, Transducer diff error	A motor node equipped with two position transducers, whose positions differs more than specified.	Not used.	- Check that the correct parameter file is used. - Check the position transducers.
02, Transducer not present	The position transducer is not connected to the node.	Not used.	- Check that the correct parameter file is used. - Check the position transducer.
03, Collision	A collision has occurred.	1: Collision type. 1 byte.	- See table 6.1
04, Encoder overflow	An encoder overflow has been detected.	Not used.	- Check that the correct parameter file is used. - Check the encoder. - Contact dealer.
05 Uncontrolled movement	An uncontrolled movement has been detected.	Not used.	- Check if it was an actual movement or just a false position reading that caused the uncontrolled movement. - Check the potentiometer.

Component Id 04, Driver Error

Reason	Description and status of System	Extra	Corrective action
01, Servo on error	Failed to perform a servo on	Not used.	- Check the 36V power voltage. - Check the DC-board fuse. - Check that the voltage between J3:2-J3:6 and J3:3-J3:6 (on the DC-boards) are zero volts.
02, Temperature error	Temperature of the driver is too high.	Not used.	- Let the DC-board cool off.
03, Shoot through error	Shoot through currents detected in the H-bridge of the driver.	Not used.	- Check for shortcuts in motor cabling and motor. Both between cables and toward chassis. - Change board.
04, Output current error	Error with the output current from the driver.	Not used.	- Check the 36V power voltage. - Check the DC-board fuse.
05, Output over voltage error	Error with the output voltage on the driver.	Not used.	- Check that the correct parameter file is used. - Contact dealer.
06, Driver watchdog error	A watchdog error from the driver was detected.	Not used.	- Check that the correct parameter file is used. - Contact dealer.
07, Communication error	Failed to communicate with the driver.	Not used.	- Check that the correct parameter file is used. - Contact dealer.
08, Motor error	Error with the motor detected.	Not used.	- Check that the correct parameter file is used. - Contact dealer.

Component Id3, CAN Driver Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 4, Timer Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 10, Communication Interface Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 11, ACAN Component

Reason	Description and status of System	Extra	Corrective action
01 Message not decoded	Internal software error.		- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Add node reason	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
03 Bus off	CAN-bus error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged. - Change boards.
04 Bus off not present	A previously reported CAN error has now been cleared.	N.a	
05 Error warning	CAN-bus error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged. - Change boards.

06 Error warning not present	A previously reported CAN error has now been cleared.	N.a	
07 RX buffer overflow	Internal software error.	N.a	- Contact dealer.
08 SJA1000 data overrun	Internal software error.	N.a	- Contact dealer.
09 Transmit error	CAN-bus error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged.
10 TX buffer overflow	Internal software error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged. - Contact dealer.

Component Id 12, ASAP Component

Reason	**Description and status of System**	**Extra**	**Corrective action**
N.a.			

Component Id 13, Data Reader Component

Reason	**Description and status of System**	**Extra**	**Corrective action**
N.a.			

Component Id 20, JMATH Component

Reason	**Description and status of System**	**Extra**	**Corrective action**
N.a.			

Component Id 21, Linked List Component

Reason	**Description and status of System**	**Extra**	**Corrective action**
N.a.			

Component Id 30, Event Server Component

Reason	Description and status of System	Extra	Corrective action
01 Add event reason	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 31, Event Source Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 32, Client Manager Component

Reason	Description and status of System	Extra	Corrective action
01 Client id invalid	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Add client reason	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 33, Call Back Receiver Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 34, System Message Manager

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 35, Time Out Server Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 36, Memory Manager Component

Reason	Description and status of System	Extra	Corrective action
01 Memory exhausted	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 40, System Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 41, Master Component

Reason	Description and status of System	Extra	Corrective action
01 Enable nodes timeout	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Enable managers timeout	Internal software error.	1: Line number in the code. 4 bytes.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

03 Unexpected disable node	Internal software error.	1: Line number in the code. 4 bytes.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
04 Emergency stop	An emergency stop button was activated.	Not used.	- Release emergency button.
06 Event queue overflow	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
08 Unknown node	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 42, Configuration Component

Reason	Description and status of System	Extra	Corrective action
01 Parameter checksum	An checksum error has been detected.	1: The calculated checksum. 1 byte. 2: Stored inverted checksum. 1 byte. 3: Stored checksum. 1 byte.	- Download the correct parameter file. - Change board.

Component Id 50, Movement Manager Component

Reason	Description and status of System	Extra	Corrective action
01 Add movement	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Unknown movement	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 51, Movement Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 54, Single Movement Component

Reason	Description and status of System	Extra	Corrective action
01 Start not allowed	A start of a movement was denied.	1: Start allowed result. 1 byte. 2: Movement direction. 1 byte. 3: Source id. 2 bytes, see tables at page 8-18.	- Check that the table top is leveled, this is checked by: Difference between Z1 and Z2 height (read in service software) should be less than 4 millimeters. - Use the service software to check the angle given from the tilt sensor. If appropriate calibrate the tilt sensor.

Component Id 55, Auto-position Component

Reason	Description and status of System	Extra	Corrective action
01 Movement fail	A start of an auto position movement failed	1: Start allowed result. 1 byte. 2: Line number in the code. 3 bytes.	- Check that the table top is leveled, this is checked by: Difference between Z1 and Z2 height (read in service software) should be less than 4 millimeters. - Use the service software to check the angle given from the tilt sensor. If appropriate calibrate the tilt sensor.
02 All paused	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 56, Brake Movement Component

Reason	Description and status of System	Extra	Corrective action
01 Incorrect configuration	The brake movement was told to start a directional movement.	1: source id.4 byte.	- Check that a valid System software release is used. - Check the configuration.
02 Unlock brakes not allowed	It was not possible to unlock the brakes.	1: Start allowed result. 1 byte. 2: source id.3 bytes, see tables.	- Check that the table top is leveled. - Check the angle given from the tilt sensor.

Component Id 57, Double Movement Component

Reason	Description and status of System	Extra	Corrective action
01 Start not allowed	A start of a movement was denied.	1: Start allowed result. 1 byte. 2: Movement direction. 1 byte. 3: Source id. 2 bytes (see tables).	- Check that the table top is leveled, this is checked by: Difference between Z1 and Z2 height (read in service software) should be less than 4 millimeters. - Use the service software to check the angle given from the tilt sensor. If appropriate calibrate the tilt sensor.
02 End set point timeout	Internal software error.	Not used.	- Contact dealer.

Component Id 70, Supervisor Component

Reason	Description and status of System	Extra	Corrective action
01 Table top alignment error	The table top is not level.	1: Height difference between Z1 and Z2, in 0.1 mm. 4 bytes	- Press foot pedal until table top is leveled; this may require that the pedal is pressed more than once.
02 Tilt sensor full movement	The tilt sensor does not prevent any movement.	1: Table top angle (0.01°), given from the tilt sensor. 4 bytes.	
03 Tilt sensor restricted angle	The tilt sensor does prevent movement.	1: Table top angle (0.01°), given from the tilt sensor. 4 bytes.	- Press foot pedal until table top is leveled; this may require that the pedal is pressed more than once. - If table top is leveled (measure with water level) calibrate the tilt sensor.
04 Guard crash detected	The guard board has detected a crash.	1: Crash direction, 1 for a positive crash and 2 for a negative crash. 1 byte.	- Remove obstacle.

Component Id 80, Node Component

Reason	Description and status of System	Extra	Corrective action
01 Message decode	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Communication not established	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 81, Slave Node Component

Reason	Description and status of System	Extra	Corrective action
01 watchdog timeout	A watchdog timeout occurred.	1: Source id. 1 byte. 2: Line number in the code. 2 bytes.	- Check the state of the node (shown I service software). - Check the LED's on the board (for error indication).
02 Unexpected node state	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
03 Set state failed	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
04 Acknowledge status	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

05 Init timeout	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
06 Node ready	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Component Id 82, Motor Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 83, Guard Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 90, Foot Pedal Component

Reason	Description and status of System	Extra	Corrective action
01 Switch active at start up	A pedal was active at start up.	1: Current foot pedal input status. 4 bytes. The following masks are used: Z up 0x0000 0001 Z down 0x0000 0002 X brake 0x0000 0004 Y brake 0x0000 0008 XY brake 0x0000 0200 DMG 0x0000 0100	- Check foot pedal.
01 Switch active at start up	The time between activation/ deactivation of the Z up/down and the dmg switch was too large.	Not used.	- Check foot pedal.
03 Switch function deactivated	The activated switch functionality was deactivated.	Not used.	- Some earlier error caused that this function has been deactivated.

Component Id 91, Tilt Sensor Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Component Id 93, Emergency Switch Component

Reason	Description and status of System	Extra	Corrective action
01 Switch active at start up	An emergency switch was active at start up.	1: Current emergency switch input status. 4 bytes. The following masks are used: Internal 0x00000400 External 0x00000800	- Check the emergency switches.
02 Internal emergency switch is activated	The internal emergency switch was activated.	Not used.	
03 External emergency switch is activated	The external emergency switch was activated.	Not used.	
04 Emergency switch released	The last emergency switch was deactivated.	Not used.	

Component Id 94, ASAP Client Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

7.1.2.5 Master Node

Definitions

The information in the tables below refer to the notes in the column “Extra” in the tables above.

Table 7-2 IDs used to identify the movements.

Movement ID	Number	Description
Z1 movement	0	Z1 column
Z2 movement	1	Z2 column
Table top x movement	2	Table top X-direction
Table top x movement	3	Table top Y-direction

Table top movement	16	Table top Z-direction
Auto-position movement	32	Auto-positioning table top Z-direction

Table 7-3 IDs used to identify the different parts within the master.

Source ID	**ID**
None	0
Internal	1
Supervisor	2
System	3
Master	4
Movement manager	10
Movement Z1	11
Movement Z2	12
Movement table top X	13
Movement table top Y	14
Movement table top	15
Movement auto-position	16
System message manager	30
Motor Z1	40
Motor Z2	41
Guard	42
Foot pedal	50
Emergency switch	51
Tilt sensor	52
CLI handler	60
ACAN client	61

Table 7-4 IDs used to identify the different start allowed results.

Movement	**Number**	**Description**
OK	0	Ok to start.
Supervisor not enabled	1	
Auto-position already started	2	

Tilted	3	Table top not level.
Crash	4	Guard crash active.
Error	5	An error has occurred.

Table 7-5 IDs used to identify the different movement directions.

Movement	Number	Description
No direction	0	Ok to start.
Positive direction	1	
Negative direction	2	
Unknown direction	3	Table top not level.

7.1.3 CB800-board

7.1.3.1 Fault Handling

There are three types of NOTIFICATIONS - Shows the present occurrence. For example; collision. They are listed below in ranking order.

1. ERROR — The error information appears as a red bar in the lower part of the display. Sound; two beeps.
2. WARNING - Appears as a grey bar in the lower part of the display. Sound; one beep.
3. INFO - Not shown to the user. Only registered in the setting menu.

Notifications

- 1) Error

When an error occurs, an Error pop-up window will appear in the display.

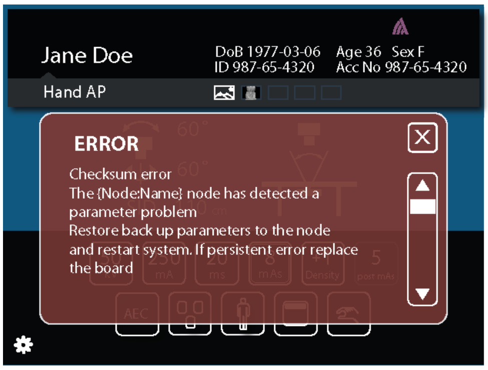


Fig. 7-2 Error pop-up window

The Error pop-up window will disappear when the user pushes the close button.

Fig. 7-3 Close button

When closing the Error pop-up window (**Fig. 7-2**), a red information bar will appear (see **Fig. 7-4** and **Fig. 7-5**).

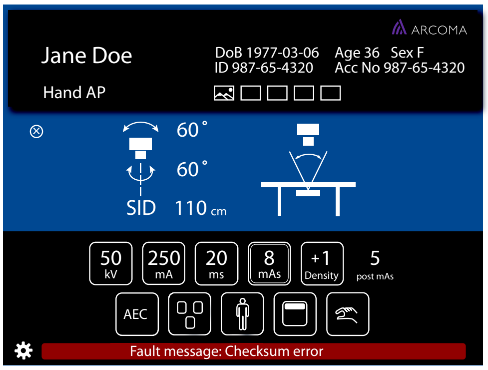


Fig. 7-4 Error information bar, Table

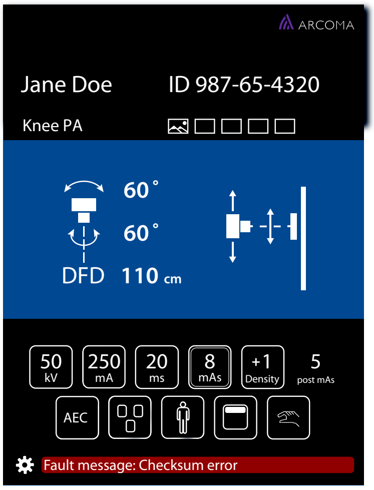


Fig. 7-5 Error information bar, Wallstand

When the user pushes the red information bar, the Error pop-up window will appear again.

The Error information bar (lower part of the window) is present until the error is fixed or the system is restarted.

2) Warning

A warning message will appear in a Warning information bar (lower part of the display), when the handling of the system justifies that.

The Warning information bar will be cleared if/when a new warning is displayed, or after time.

The latest sent warning is shown.

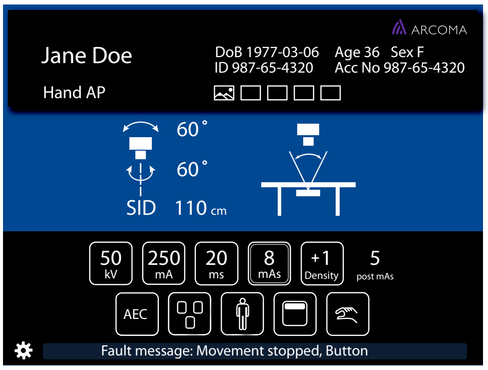


Fig. 7-6 Warning information bar, Table

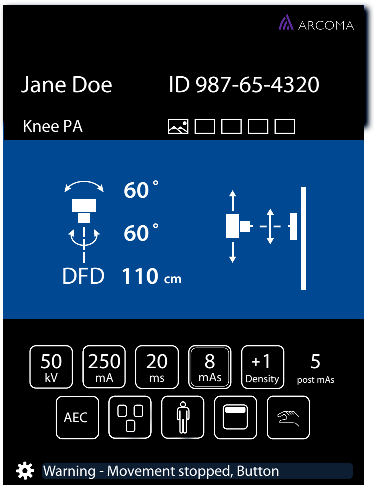


Fig. 7-7 Warning information bar, Wallstand

When pushing the Warning information bar, (see **Fig. 7-6** and **Fig. 7-7**), a pop-up window will appear (see **Fig. 7-8** and **Fig. 7-9**).

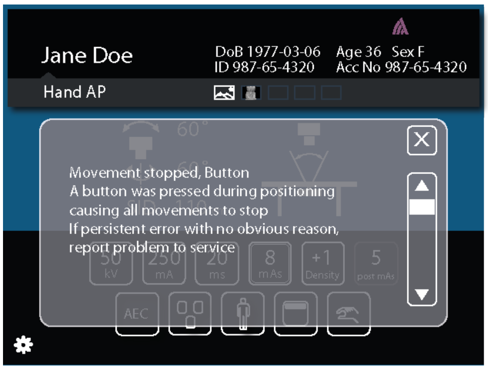


Fig. 7-8 Pop-up window — Warning information bar

When the user closes the pop-up window, the Warning Information bar will appear again.

The Warning pop-up window will also appear again, when the user pushes the information bar.

Fig. 7-9 Pop-up window — Information bar

The *Warning pop-up window* disappears when the user pushes the close button.

Fig. 7-10 Close button

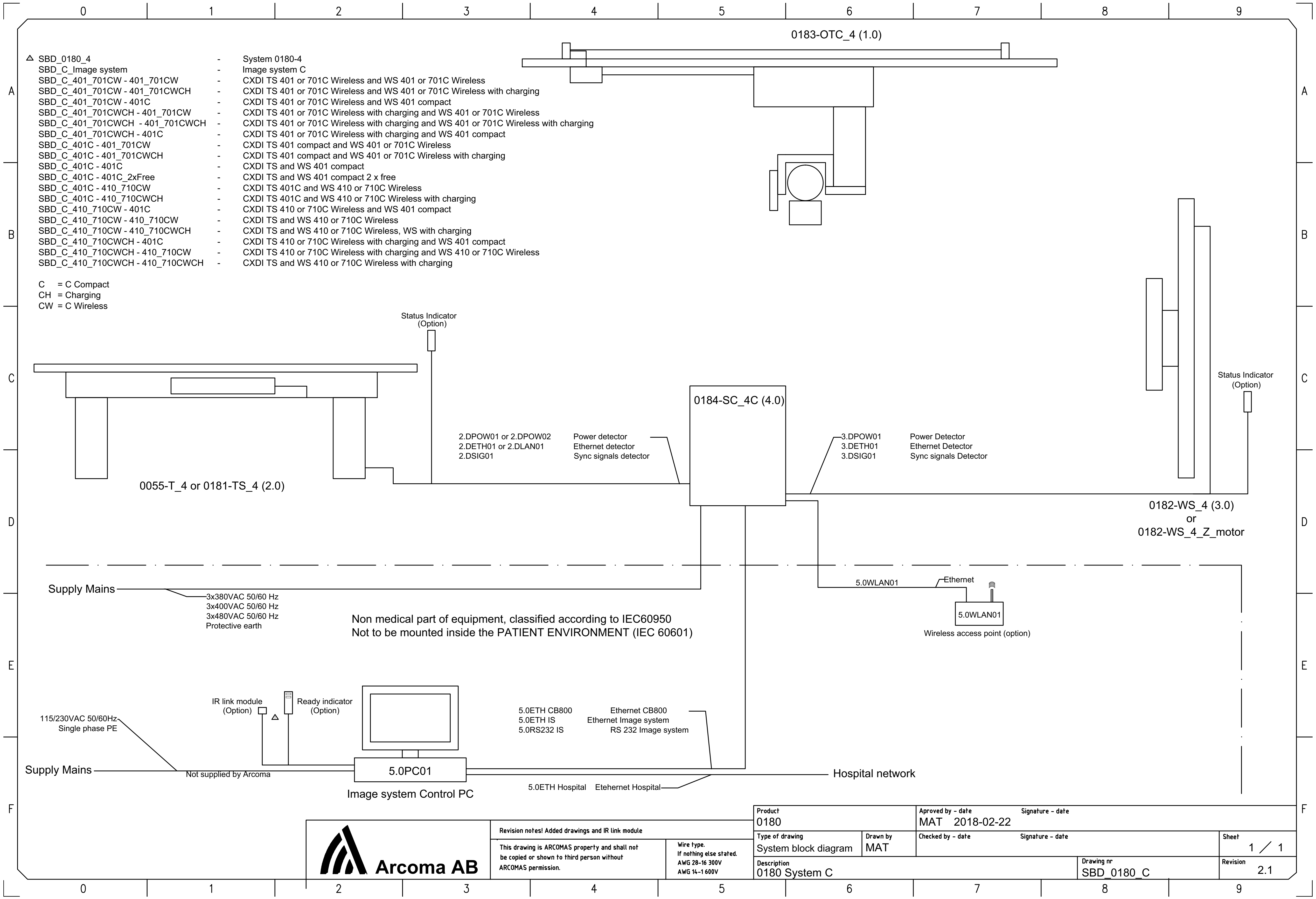
Log

The *Log file* is part of the *Setting menu* and reached by pressing the gear or the *Error/ Warning messenger* bars.

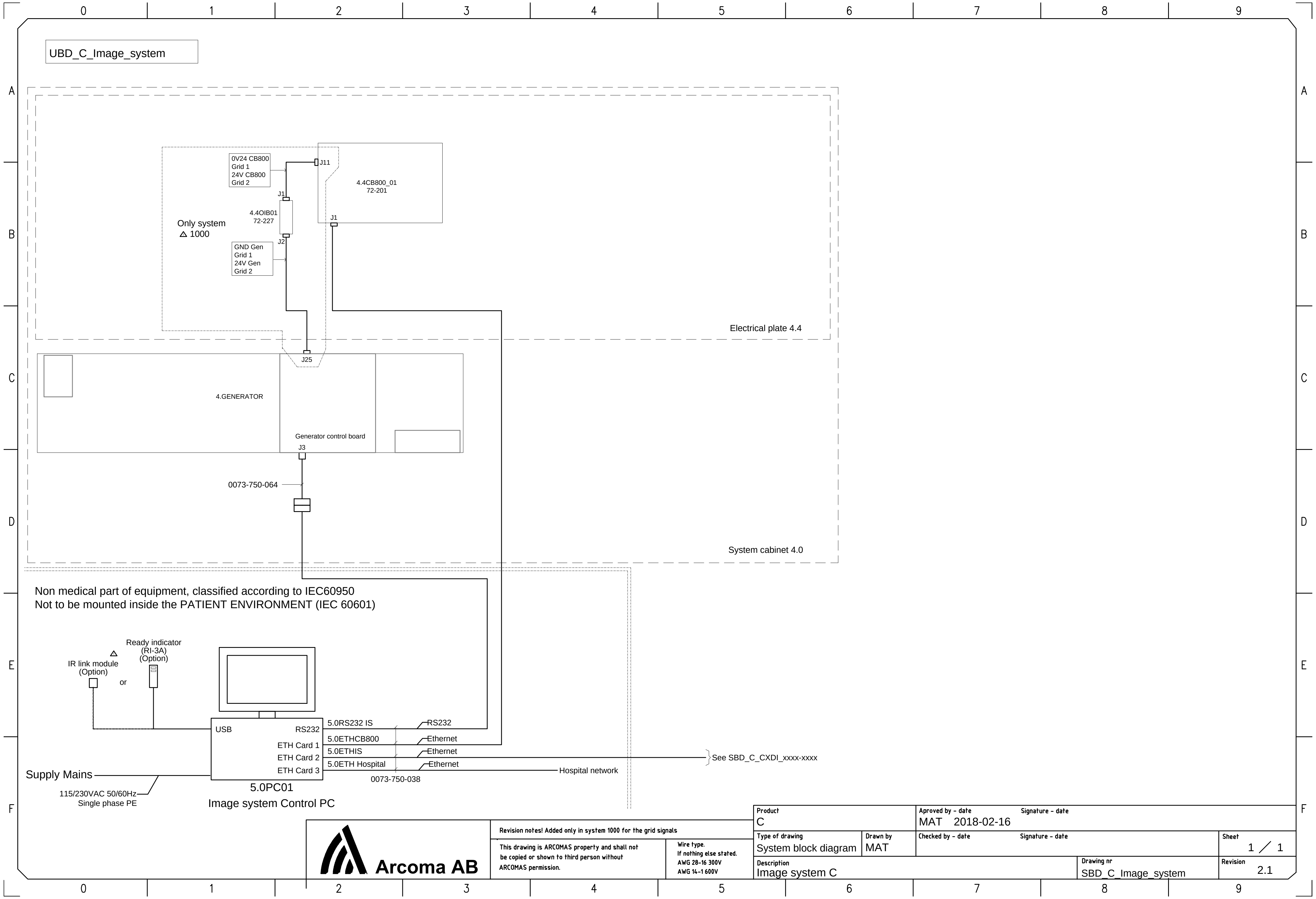
8 Electrical drawings

8.1 Notes regarding the electrical drawings

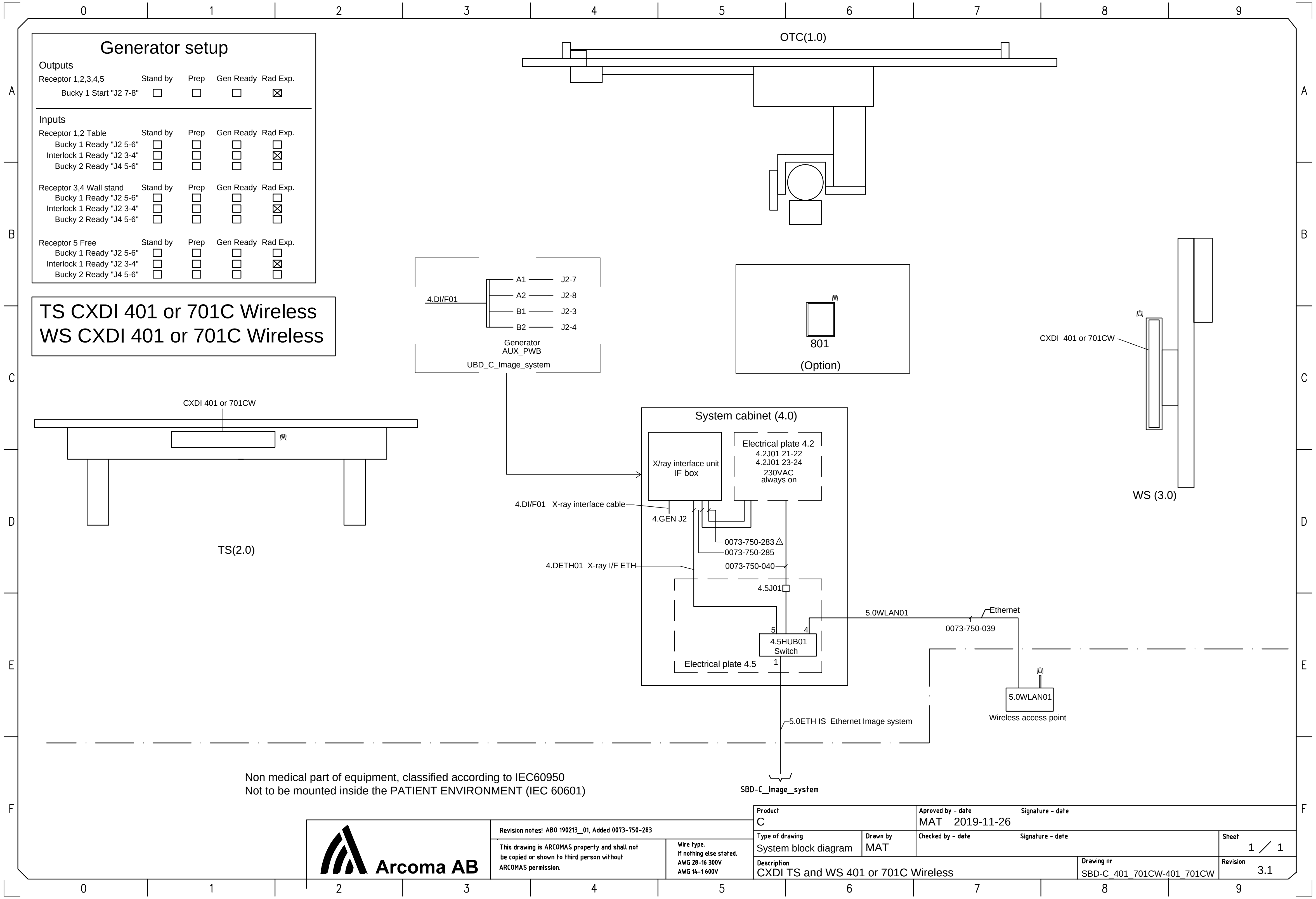
- Options are not available on all markets.
- Where electrical drawings describes several versions, 4C is applicable for Intuition.
- Electrical drawings for CXDI410C and 710C are also valid for CXDI402C and 702C.



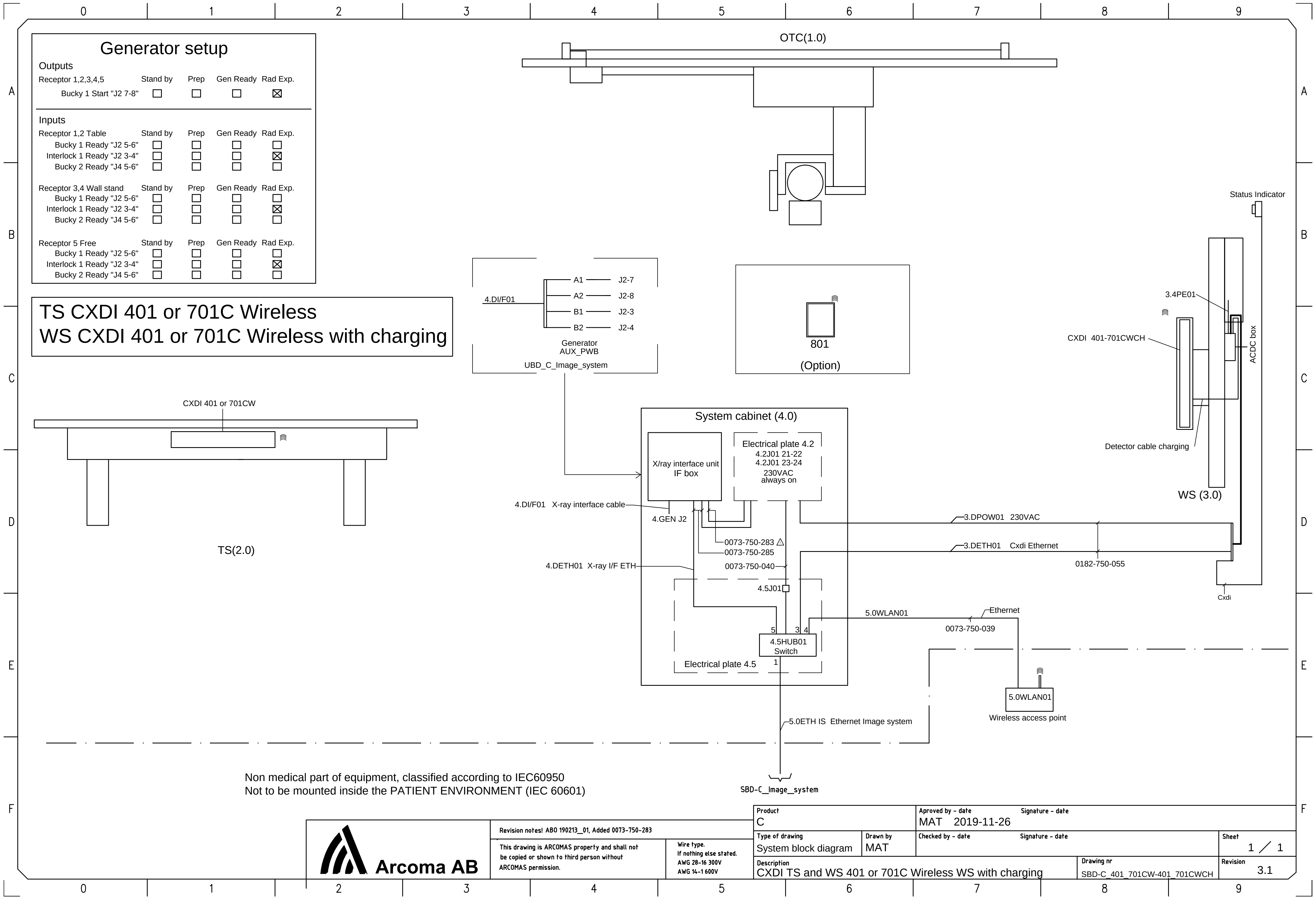
0183-OTC_4 (1.0)
SBD_0180_4 - System 0180-4
SBD_C_Image system - Image system C
SBD_C_401_701CW - 401_701CW - CXDI TS 401 or 701C Wireless and WS 401 or 701C Wireless
SBD_C_401_701CW - 401_701CWCH - CXDI TS 401 or 701C Wireless and WS 401 or 701C Wireless with charging
SBD_C_401_701CW - 401C - CXDI TS 401 or 701C Wireless and WS 401 compact
SBD_C_401_701CWCH - 401_701CW - CXDI TS 401 or 701C Wireless with charging and WS 401 or 701C Wireless
SBD_C_401_701CWCH - 401_701CWCH - CXDI TS 401 or 701C Wireless with charging and WS 401 or 701C Wireless with charging
SBD_C_401_701CWCH - 401C - CXDI TS 401 or 701C Wireless with charging and WS 401 compact
SBD_C_401C - 401_701CW - CXDI TS 401 compact and WS 401 or 701C Wireless
SBD_C_401C - 401_701CWCH - CXDI TS 401 compact and WS 401 or 701C Wireless with charging
SBD_C_401C - 401C - CXDI TS and WS 401 compact
SBD_C_401C - 401C_2xFree - CXDI TS and WS 401 compact 2 x free
SBD_C_401C - 410_710CW - CXDI TS 401C and WS 410 or 710C Wireless
SBD_C_401C - 410_710CWCH - CXDI TS 401C and WS 410 or 710C Wireless with charging
SBD_C_410_710CW - 401C - CXDI TS 410 or 710C Wireless and WS 401 compact
SBD_C_410_710CW - 410_710CW - CXDI TS and WS 410 or 710C Wireless
SBD_C_410_710CW - 410_710CWCH - CXDI TS and WS 410 or 710C Wireless, WS with charging
SBD_C_410_710CWCH - 401C - CXDI TS 410 or 710C Wireless with charging and WS 401 compact
SBD_C_410_710CWCH - 410_710CW - CXDI TS 410 or 710C Wireless with charging and WS 410 or 710C Wireless
SBD_C_410_710CWCH - 410_710CWCH - CXDI TS and WS 410 or 710C Wireless with charging
C = C Compact
CH = Charging
CW = C Wireless
Status Indicator (Option)
0055-T_4 or 0181-TS_4 (2.0)
2.DPOW01 or 2.DPOW02
2.DETH01 or 2.DLAN01
2.DSIG01
Power detector
Ethernet detector
Sync signals detector
0184-SC_4C (4.0)
3.DPOW01
3.DETH01
3.DSIG01
Power Detector
Ethernet Detector
Sync signals Detector
Status Indicator (Option)
0182-WS_4 (3.0) or 0182-WS_4_Z_motor
Supply Mains
3x380VAC 50/60 Hz
3x400VAC 50/60 Hz
3x480VAC 50/60 Hz
Protective earth
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
5.0WLAN01
Ethernet
5.0WLAN01
Wireless access point (option)
IR link module (Option)
Ready indicator (Option)
115/230VAC 50/60Hz
Single phase PE
Supply Mains
Not supplied by Arcoma
5.0PC01
Image system Control PC
5.0ETH CB800
5.0ETH IS
5.0RS232 IS
Ethernet CB800
Ethernet Image system
RS 232 Image system
5.0ETH Hospital
Etehernet Hospital
Hospital network
Arcoma AB
Revision notes! Added drawings and IR link module
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2018-02-22
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
0180 System C
Drawing nr
SBD_0180_C
Revision
2.1

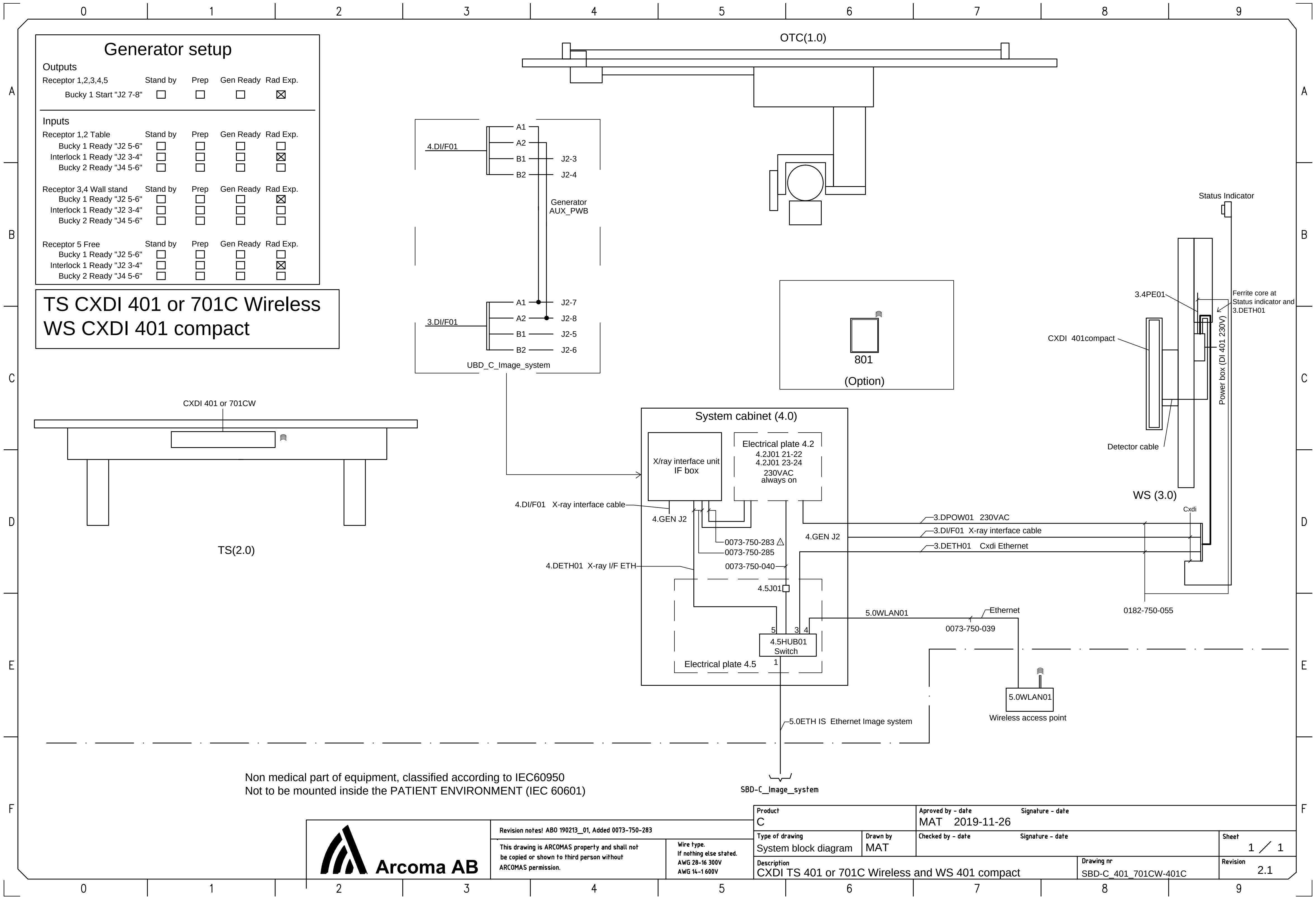


UBD_C_Image_system
0V24 CB800
Grid 1
24V CB800
Grid 2
J11
4.4CB800_01
72-201
J1
4.4OIB01
72-227
Only system
1000
J2
GND Gen
Grid 1
24V Gen
Grid 2
J1
Electrical plate 4.4
J25
4.GENERATOR
Generator control board
J3
0073-750-064
System cabinet 4.0
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Ready indicator
(RI-3A)
(Option)
IR link module
(Option)
or
USB
RS232
ETH Card 1
ETH Card 2
ETH Card 3
5.0RS232 IS
RS232
5.0ETHCB800
Ethernet
5.0ETHIS
Ethernet
5.0ETH Hospital
Ethernet
See SBD_C_CXDI_xxxx-xxxx
Hospital network
0073-750-038
Supply Mains
115/230VAC 50/60Hz
Single phase PE
5.0PC01
Image system Control PC
Arcoma AB
Revision notes! Added only in system 1000 for the grid signals
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
C
Aproved by - date
MAT 2018-02-16
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Image system C
Drawing nr
SBD_C_Image_system
Revision
2.1

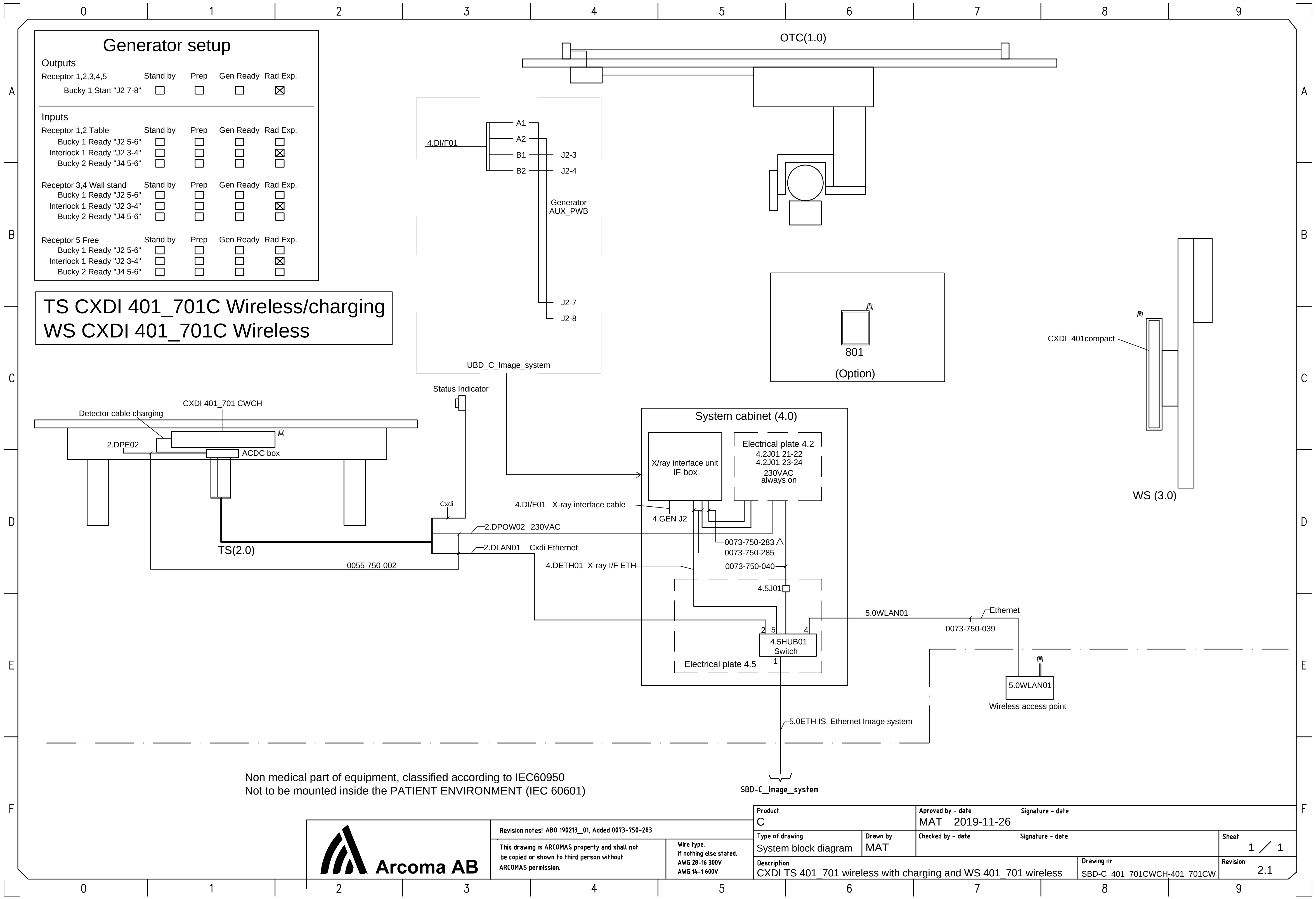


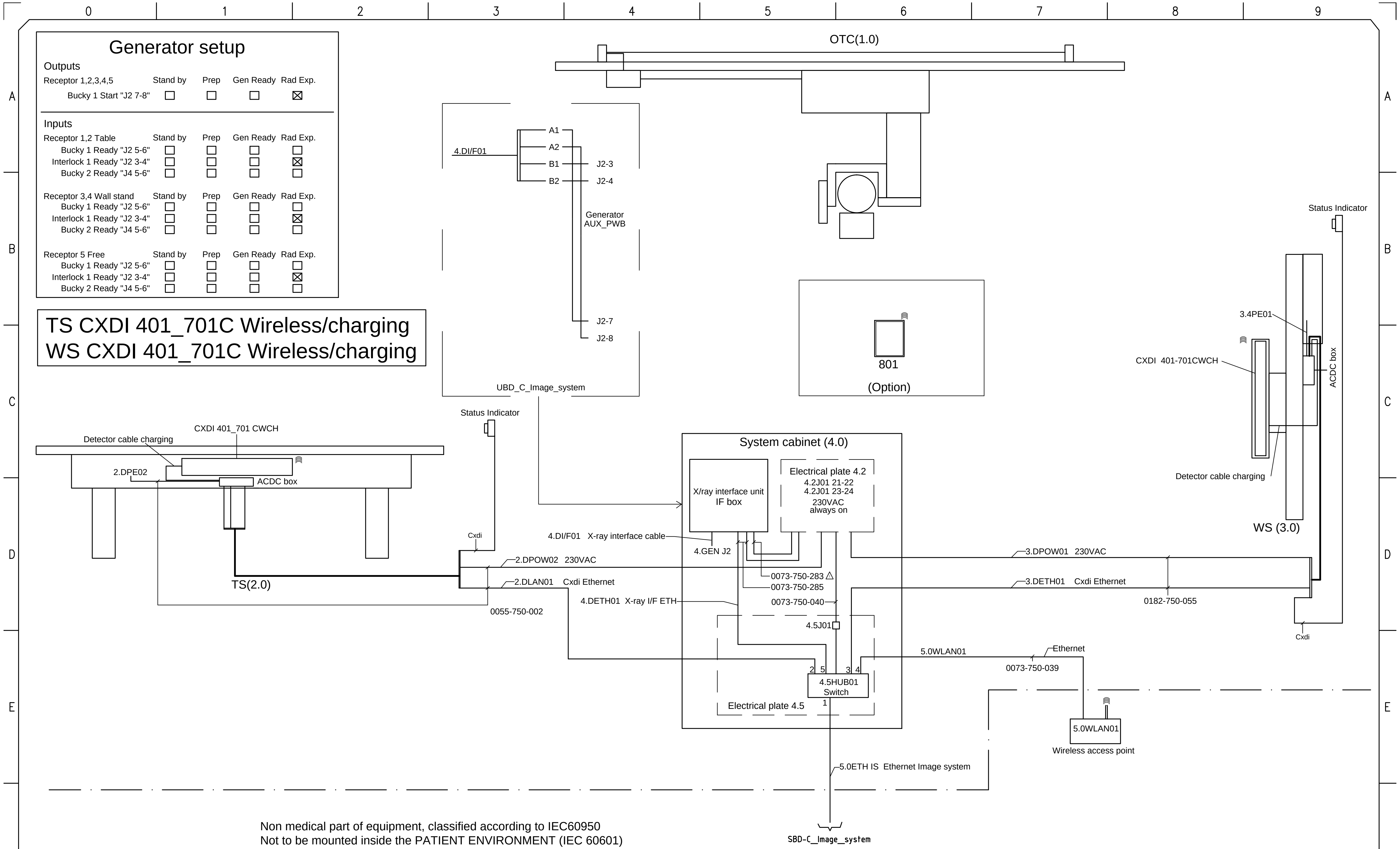
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand
Receptor 5 Free
TS CXDI 401 or 701C Wireless
WS CXDI 401 or 701C Wireless
OTC(1.0)
4.DI/F01
A1 J2-7
A2 J2-8
B1 J2-3
B2 J2-4
Generator
AUX_PWB
UBD_C_Image_system
801
(Option)
CXDI 401 or 701CW
WS (3.0)
TS(2.0)
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-283
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01
Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS and WS 401 or 701C Wireless
Drawing nr SBD-C_401_701CW-401_701CW
Revision 3.1


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 or 701C Wireless
WS CXDI 401 or 701C Wireless with charging
OTC(1.0)
4.DI/F01
A1 J2-7
A2 J2-8
B1 J2-3
B2 J2-4
Generator
AUX_PWB
UBD_C_Image_system
801
(Option)
Status Indicator
3.4PE01
CXDI 401-701CWCH
ACDC box
Detector cable charging
WS (3.0)
CXDI 401 or 701CW
TS(2.0)
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-283
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
3.DPOW01 230VAC
3.DETH01 Cxdi Ethernet
0182-750-055
Cxdi
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01
Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
C
Aproved by - date
MAT 2019-11-26
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CXDI TS and WS 401 or 701C Wireless WS with charging
Drawing nr
SBD-C_401_701CW-401_701CWCH
Revision
3.1



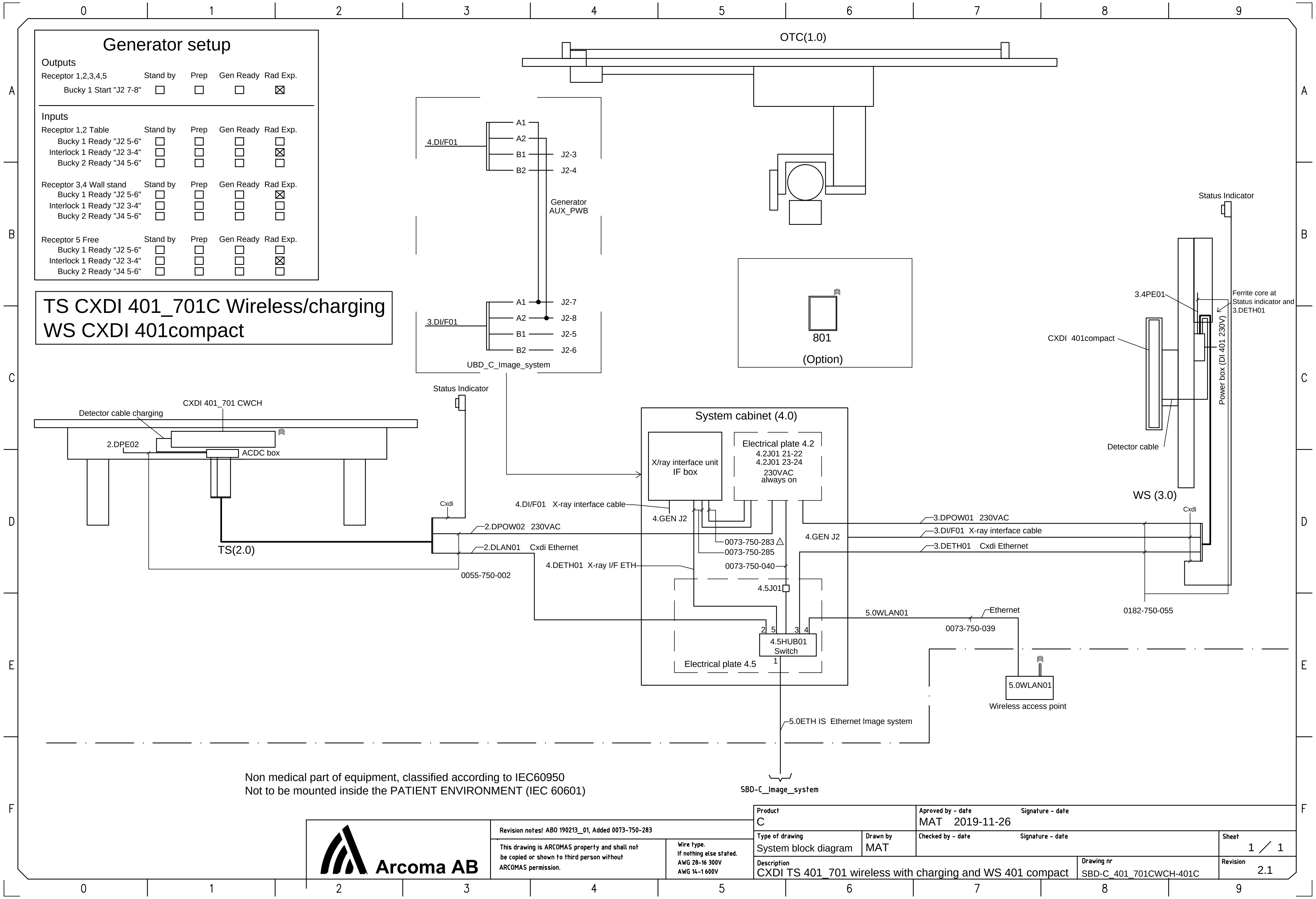
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 or 701C Wireless
WS CXDI 401 compact
4.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
OTC(1.0)
801
(Option)
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
CXDI 401 or 701CW
TS(2.0)
System cabinet (4.0)
X/ray interface unit IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
4.GEN J2
0073-750-283
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 401 or 701C Wireless and WS 401 compact
Drawing nr SBD-C_401_701CW-401C
Revision 2.1


Generator setup
Outputs
Receptor 1,2,3,4,5 | Stand by | Prep | Gen Ready | Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand
Receptor 5 Free
TS CXDI 401_701C Wireless/charging
WS CXDI 401_701C Wireless
OTC(1.0)
4.DI/F01
A1
A2
B1
B2
J2-3
J2-4
Generator AUX_PWB
J2-7
J2-8
UBD_C_Image_system
801
(Option)
CXDI 401compact
WS (3.0)
Status Indicator
CXDI 401_701 CWCH
Detector cable charging
2.DPE02
ACDC box
TS(2.0)
Cxdi
4.DI/F01 X-ray interface cable
2.DPOW02 230VAC
2.DLAN01 Cxdi Ethernet
4.DETH01 X-ray I/F ETH
0055-750-002
System cabinet (4.0)
X/ray interface unit IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.GEN J2
0073-750-283
0073-750-285
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product: C
Aproved by - date: MAT 2019-11-26
Type of drawing: System block diagram
Drawn by: MAT
Sheet: 1 / 1
Description: CXDI TS 401_701 wireless with charging and WS 401_701 wireless
Drawing nr: SBD-C_401_701CWCH-401_701CW
Revision: 2.1

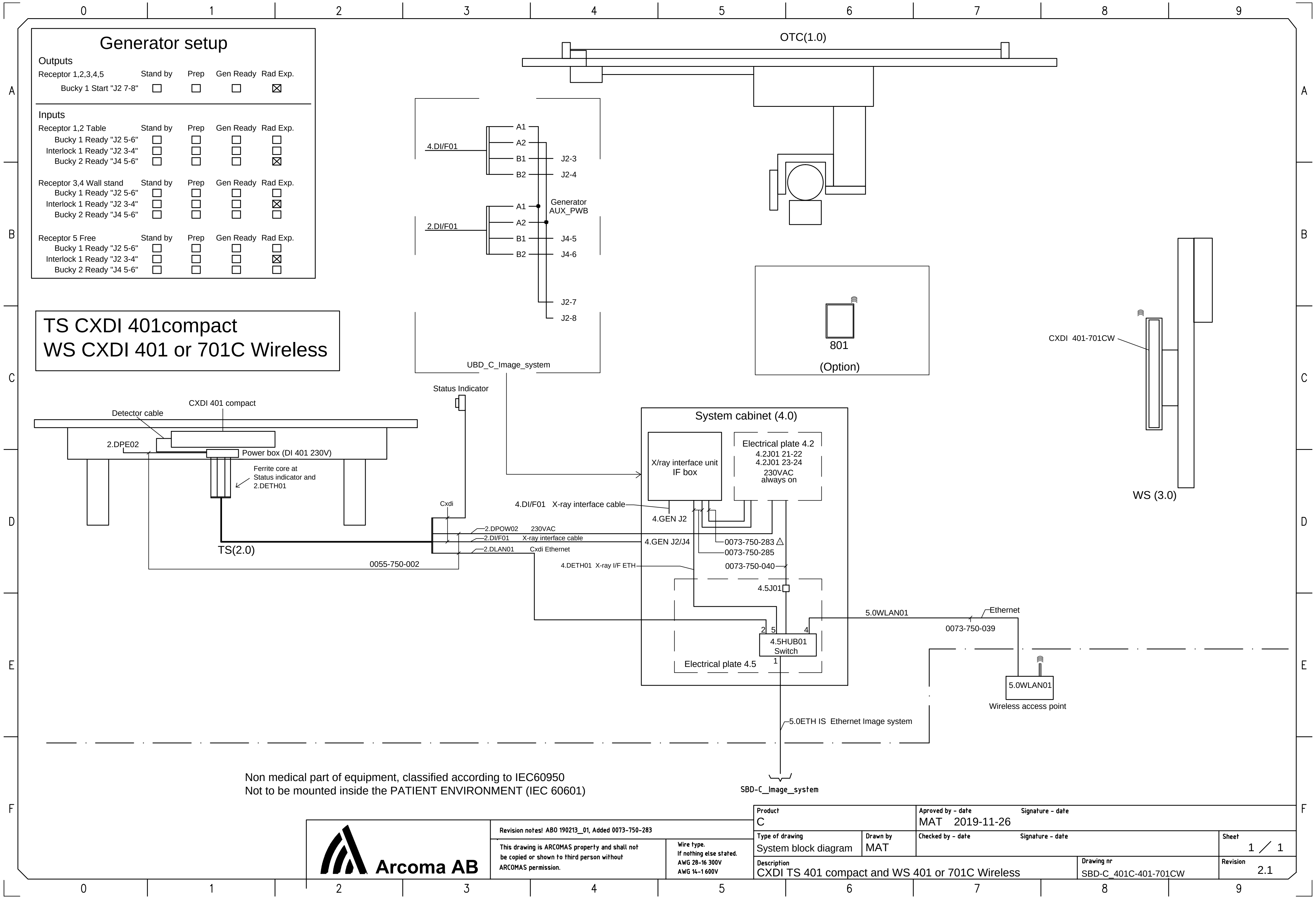


Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)

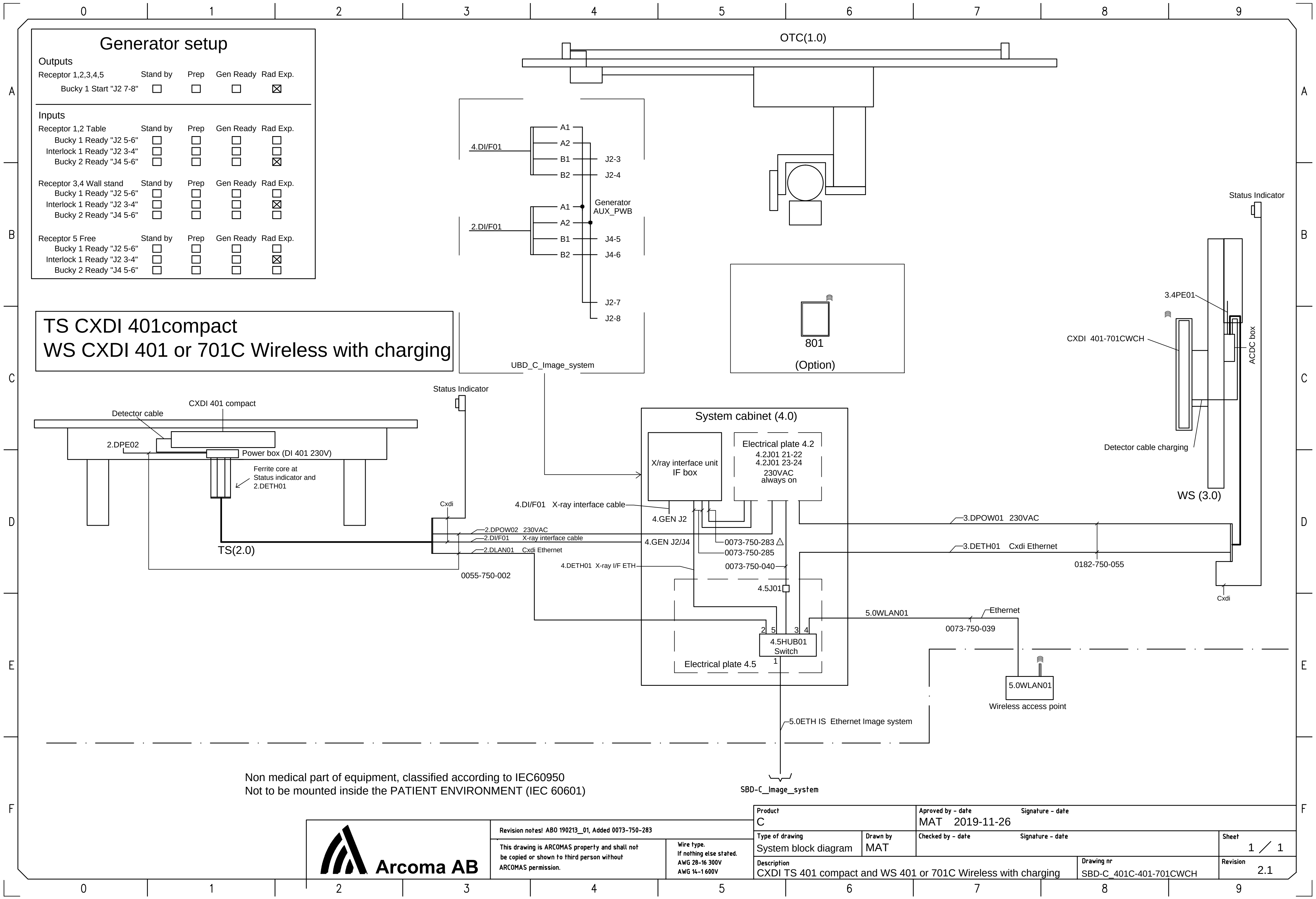
Arcoma AB	Revision notes! ABO 190213_01, Added 0073-750-283	Product: C	Aproved by - date: MAT 2019-11-26	Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission. Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Type of drawing: System block diagram; Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
		Description: CXDI TS and WS 401_701 wireless with charging	Drawing nr: SBD-C_401_701CWCH-401_701CWCH	Revision: 2.1



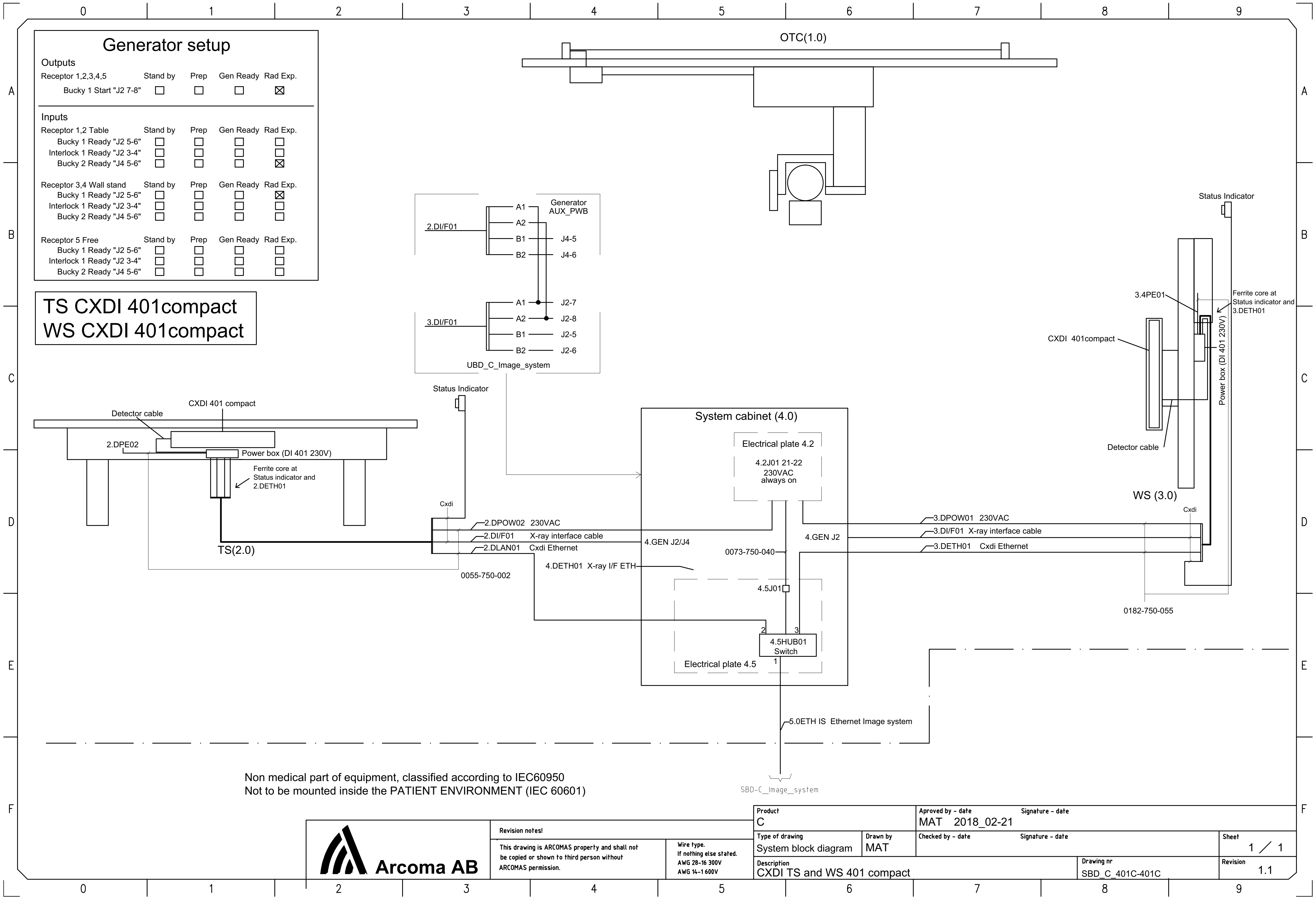
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401_701C Wireless/charging
WS CXDI 401compact
OTC(1.0)
4.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
801
(Option)
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
CXDI 401_701 CWCH
Detector cable charging
2.DPE02
ACDC box
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DLAN01 Cxdi Ethernet
0055-750-002
4.DI/F01 X-ray interface cable
4.GEN J2
4.DETH01 X-ray I/F ETH
System cabinet (4.0)
X/ray interface unit IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
0073-750-283
0073-750-285
0073-750-040
4.5J01
4.GEN J2
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS 401_701 wireless with charging and WS 401 compact
Drawing nr SBD-C_401_701CWCH-401C
Revision 2.1

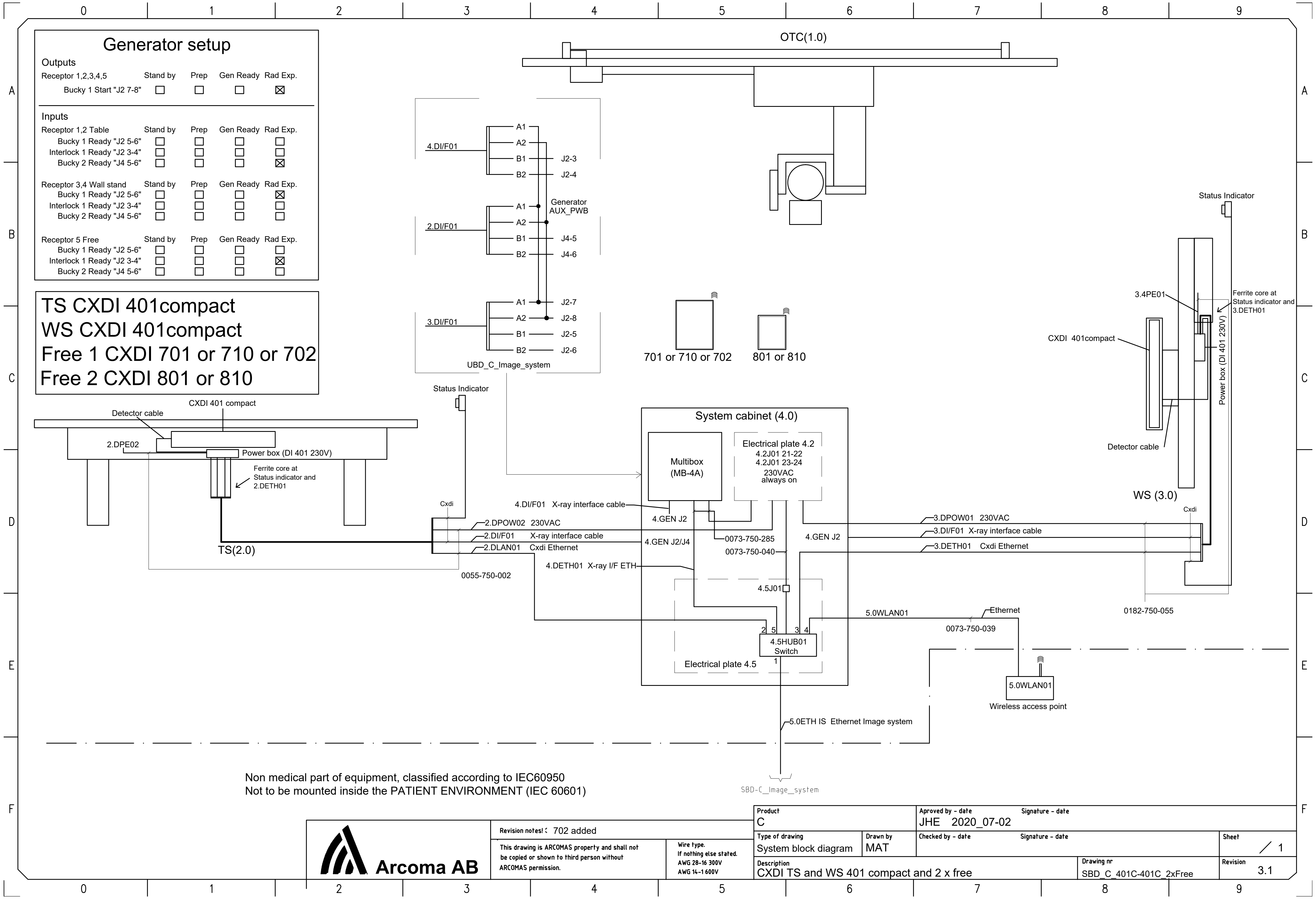


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401 or 701C Wireless
OTC(1.0)
4.DI/F01
2.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
J4-5 J4-6
J2-7 J2-8
UBD_C_Image_system
801
(Option)
CXDI 401-701CW
WS (3.0)
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
0055-750-002
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
4.DI/F01 X-ray interface cable
4.DETH01 X-ray I/F ETH
System cabinet (4.0)
X/ray interface unit IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.GEN J2
4.GEN J2/J4
0073-750-283
0073-750-285
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 401 compact and WS 401 or 701C Wireless
Drawing nr SBD-C_401C-401-701CW
Revision 2.1

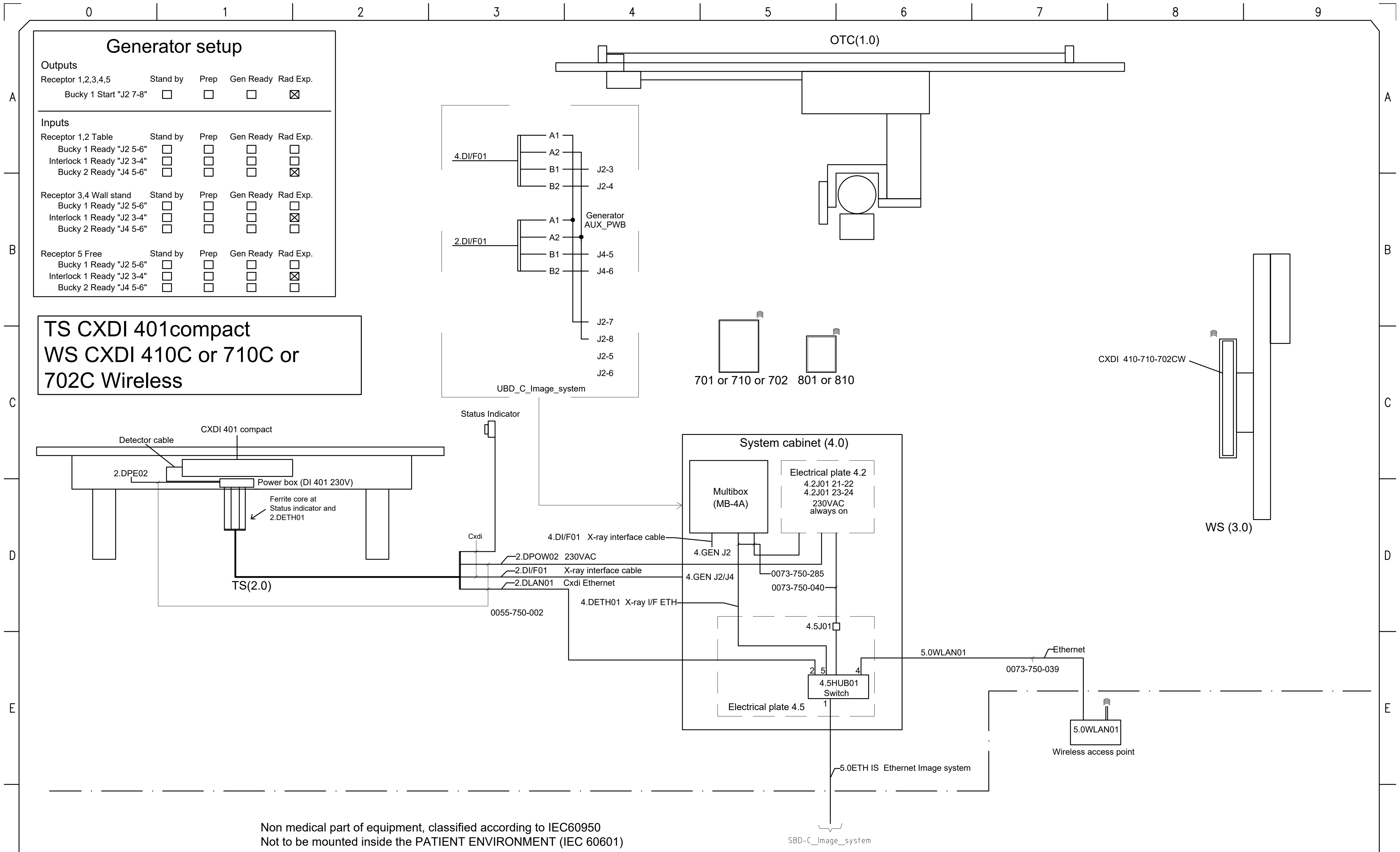


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401 or 701C Wireless with charging
OTC(1.0)
4.DI/F01
2.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
J4-5 J4-6
J2-7 J2-8
UBD_C_Image_system
801
(Option)
Status Indicator
3.4PE01
CXDI 401-701CWCH
ACDC box
Detector cable charging
WS (3.0)
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
X/ray interface unit IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
4.GEN J2/J4
4.DETH01 X-ray I/F ETH
0073-750-283
0073-750-285
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
3.DPOW01 230VAC
3.DETH01 Cxdi Ethernet
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS 401 compact and WS 401 or 701C Wireless with charging
Drawing nr SBD-C_401C-401-701CWCH
Revision 2.1

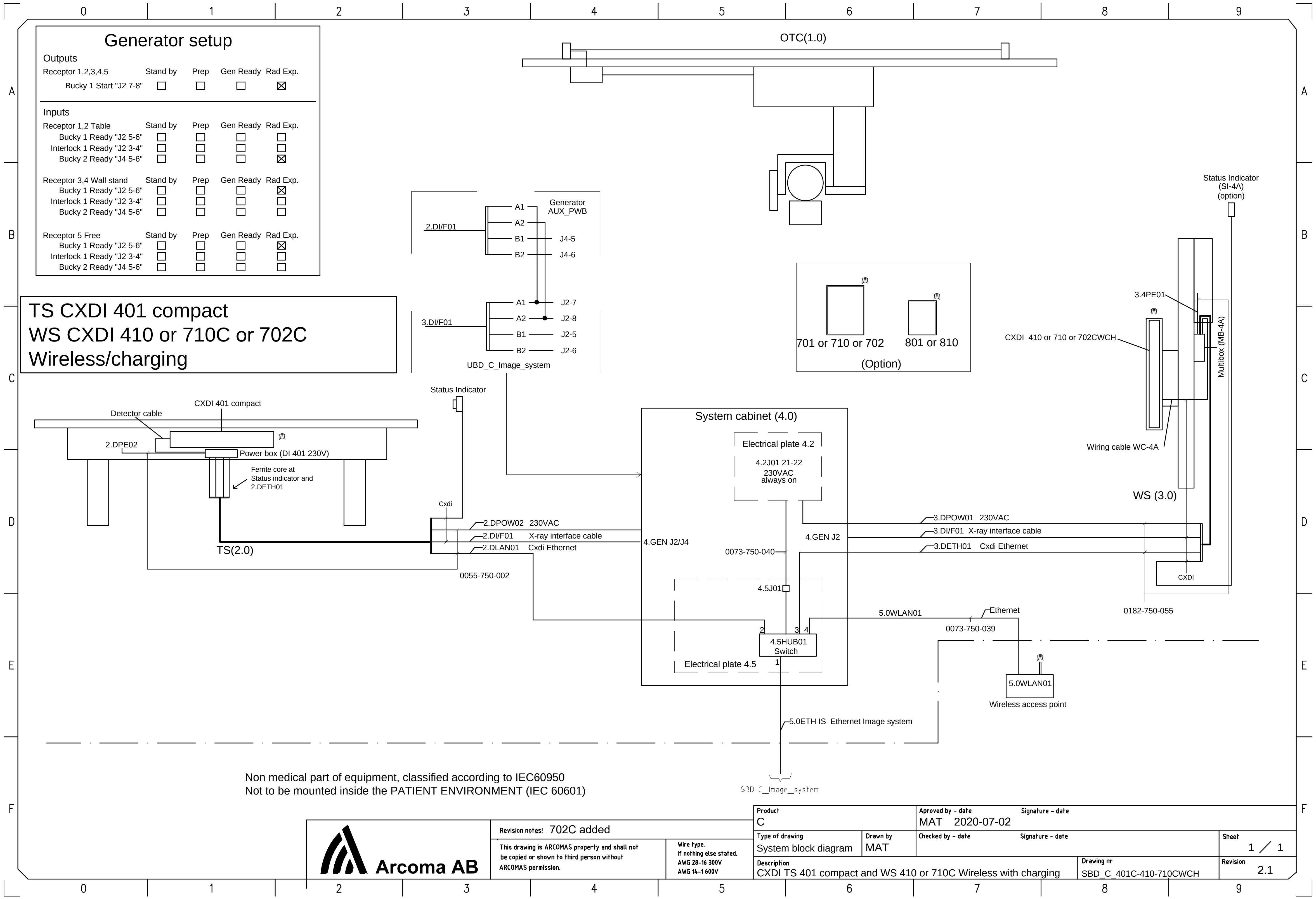

Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401compact
OTC(1.0)
Generator AUX_PWB
2.DI/F01
A1 A2 B1 B2
J4-5 J4-6
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
4.GEN J2/J4
4.GEN J2
0073-750-040
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0055-750-002
4.DETH01 X-ray I/F ETH
4.5J01
0182-750-055
4.5HUB01 Switch
Electrical plate 4.5
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2018_02-21
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS and WS 401 compact
Drawing nr SBD_C_401C-401C
Revision 1.1



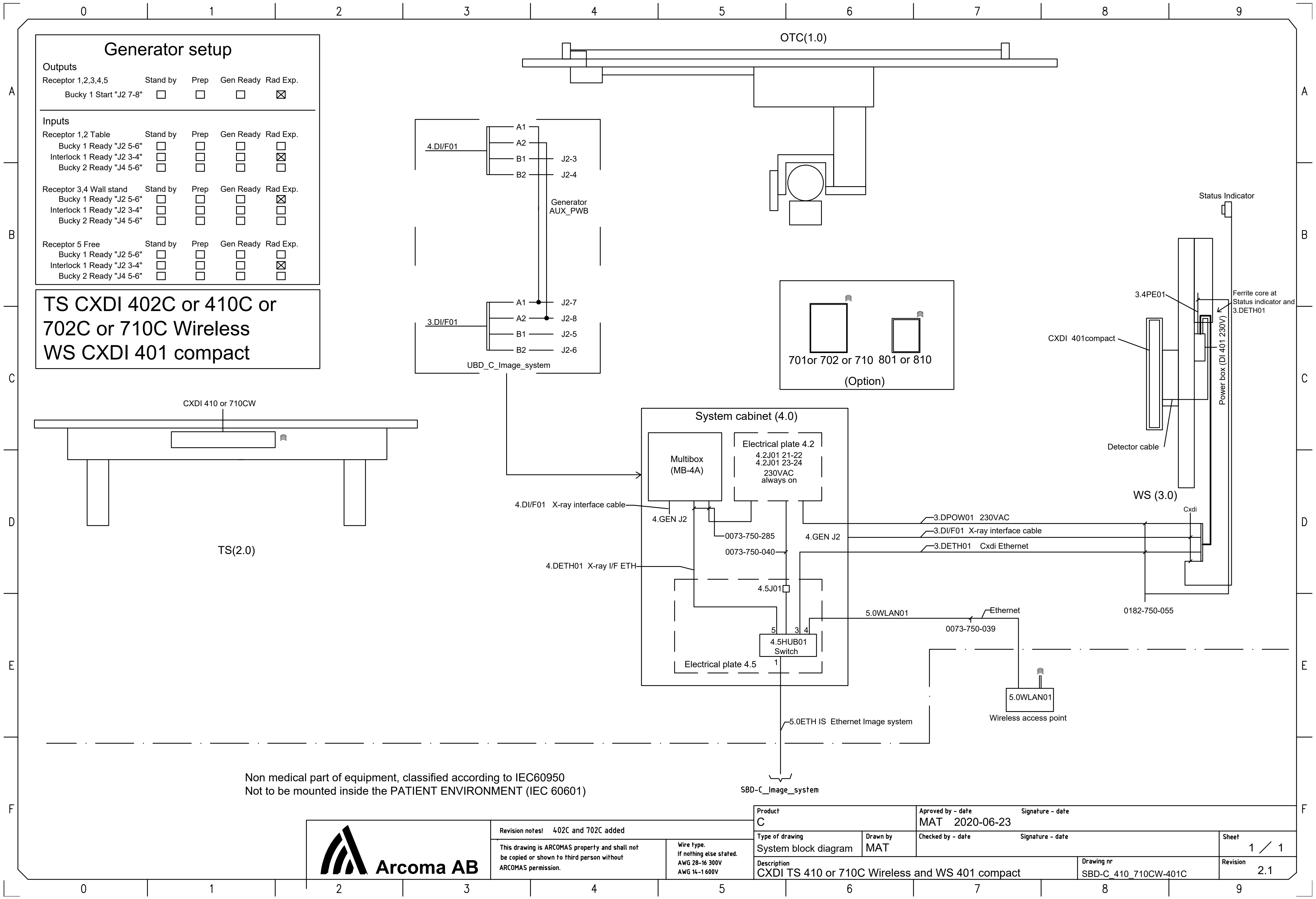
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401compact
Free 1 CXDI 701 or 710 or 702
Free 2 CXDI 801 or 810
OTC(1.0)
4.DI/F01
2.DI/F01
3.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
J4-5 J4-6
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701 or 710 or 702
801 or 810
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Multibox (MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
4.GEN J2/J4
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
0073-750-039
Ethernet
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
WS (3.0)
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes: 702 added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date JHE 2020_07-02
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1
Description CXDI TS and WS 401 compact and 2 x free
Drawing nr SBD_C_401C-401C_2xFree
Revision 3.1



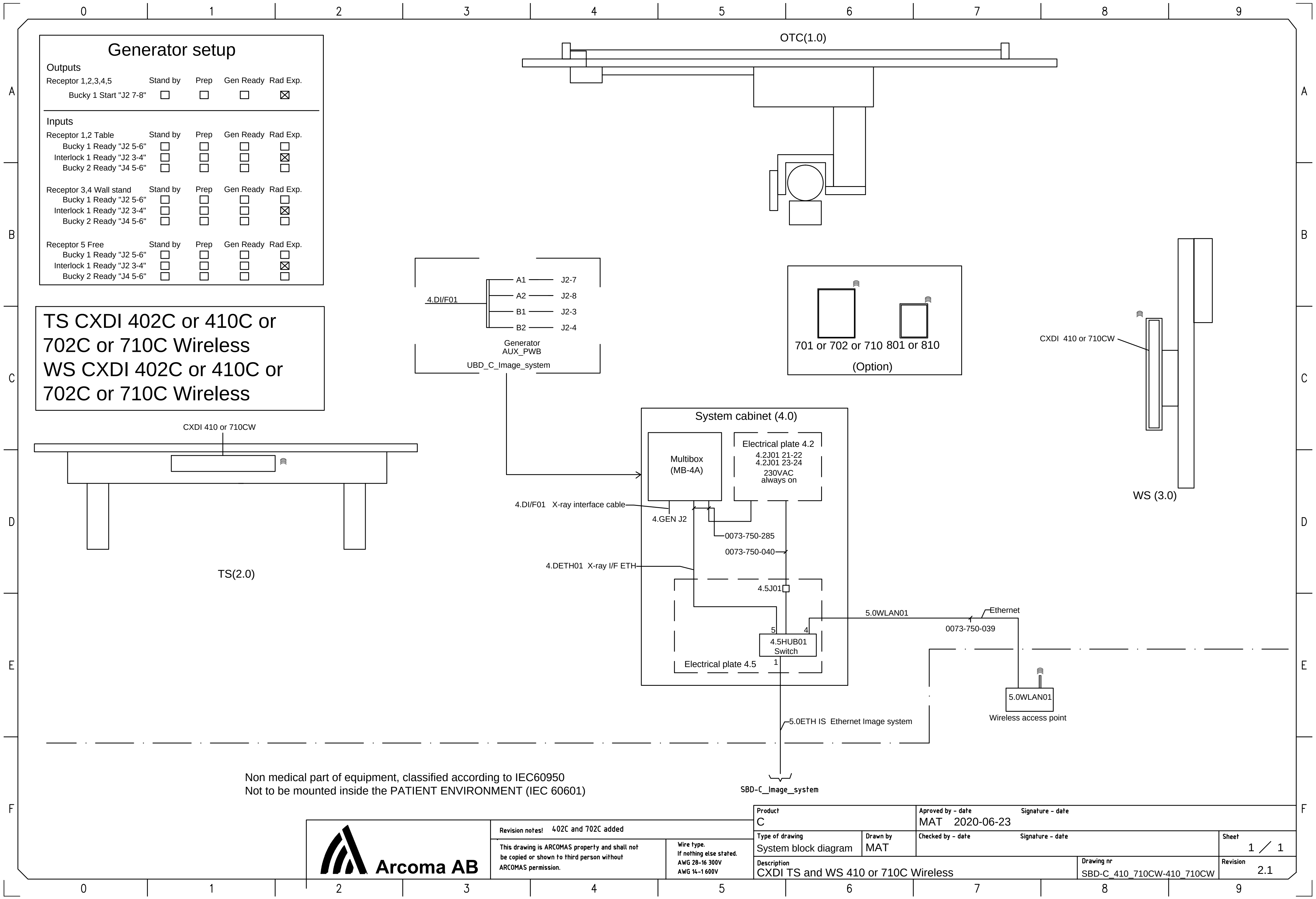
Arcoma AB	Revision notes! 702C added		Product: C	Aproved by - date: JHE 2020-07-02
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Type of drawing: System block diagram; Drawn by: MAT	Checked by - date; Sheet: 1
			Description: CXDI TS 401 compact and WS 410 or 710C Wireless	Drawing nr: SBD_C_401C-410-710CW; Revision: 2.1



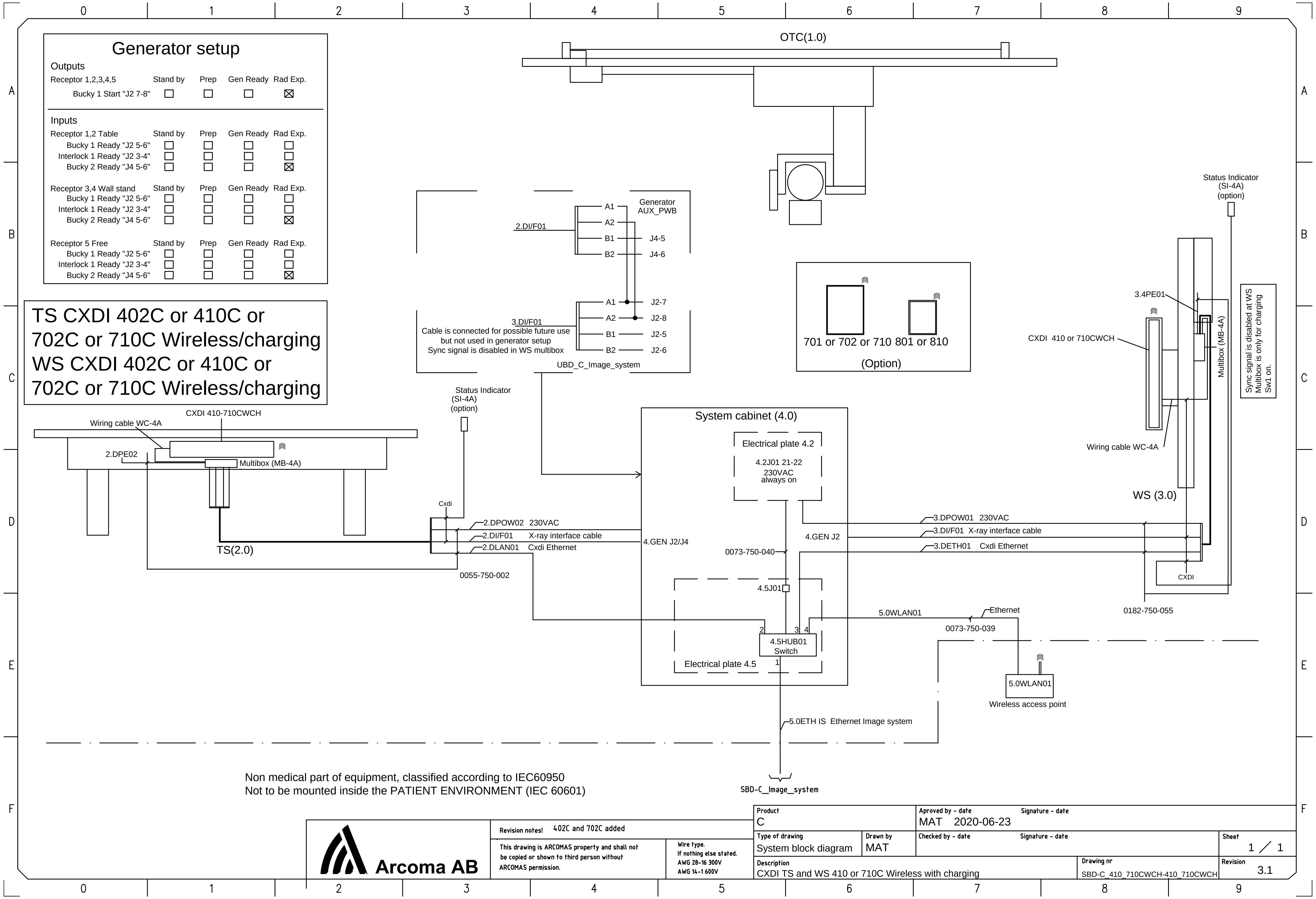
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 compact
WS CXDI 410 or 710C or 702C
Wireless/charging
OTC(1.0)
Generator AUX_PWB
2.DI/F01
3.DI/F01
A1 A2 B1 B2
J4-5 J4-6
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701 or 710 or 702
801 or 810
(Option)
Status Indicator (SI-4A) (option)
3.4PE01
CXDI 410 or 710 or 702CWCH
Multibox (MB-4A)
Wiring cable WC-4A
WS (3.0)
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
Cxdi
TS(2.0)
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22 230VAC always on
4.GEN J2/J4
4.GEN J2
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
CXDI
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-07-02
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS 401 compact and WS 410 or 710C Wireless with charging
Drawing nr SBD_C_401C-410-710CWCH
Revision 2.1



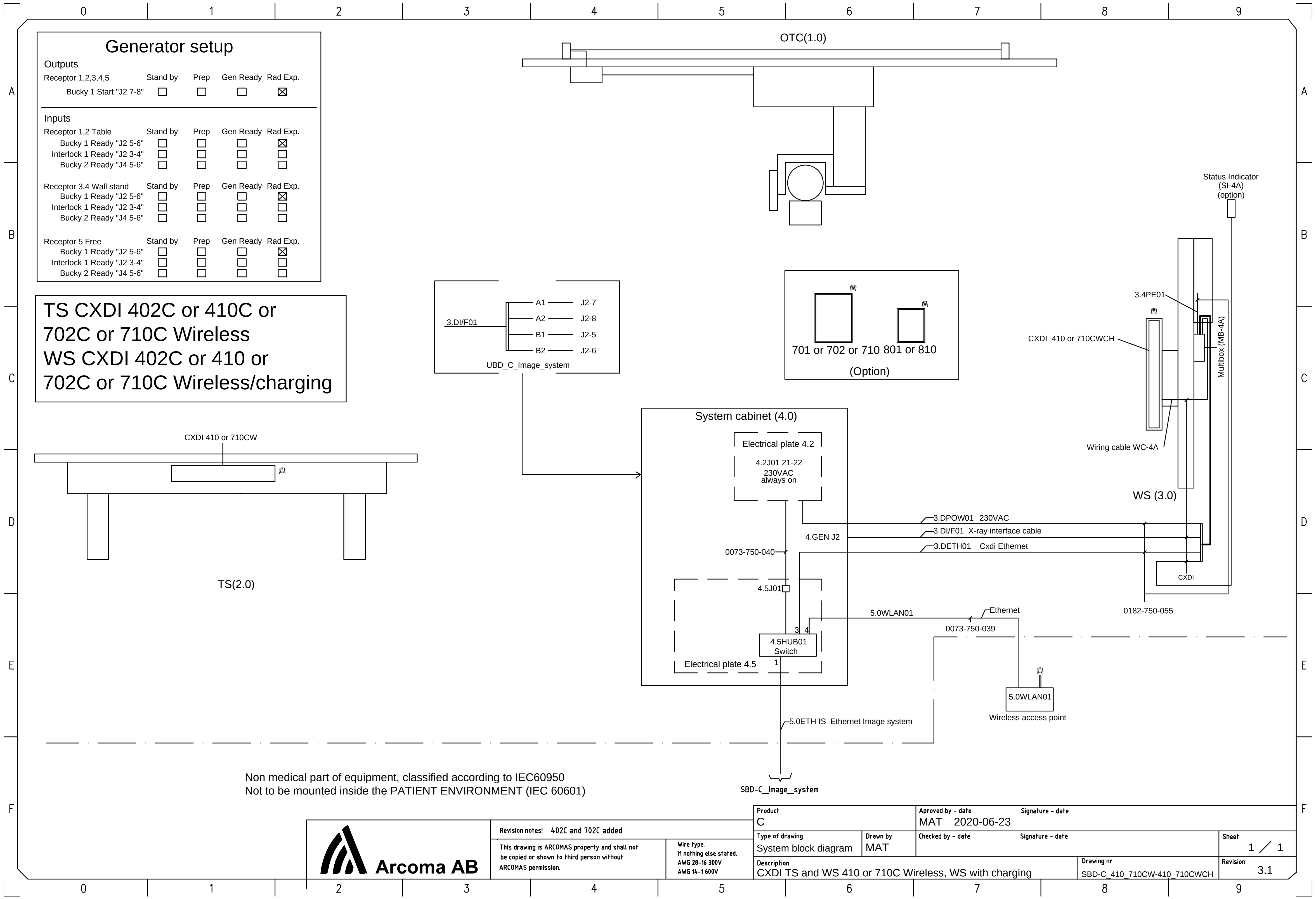
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless WS CXDI 401 compact
OTC(1.0)
4.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701or 702 or 710 801 or 810
(Option)
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
CXDI 410 or 710CW
TS(2.0)
System cabinet (4.0)
Multibox (MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
4.GEN J2
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 410 or 710C Wireless and WS 401 compact
Drawing nr SBD-C_410_710CW-401C
Revision 2.1



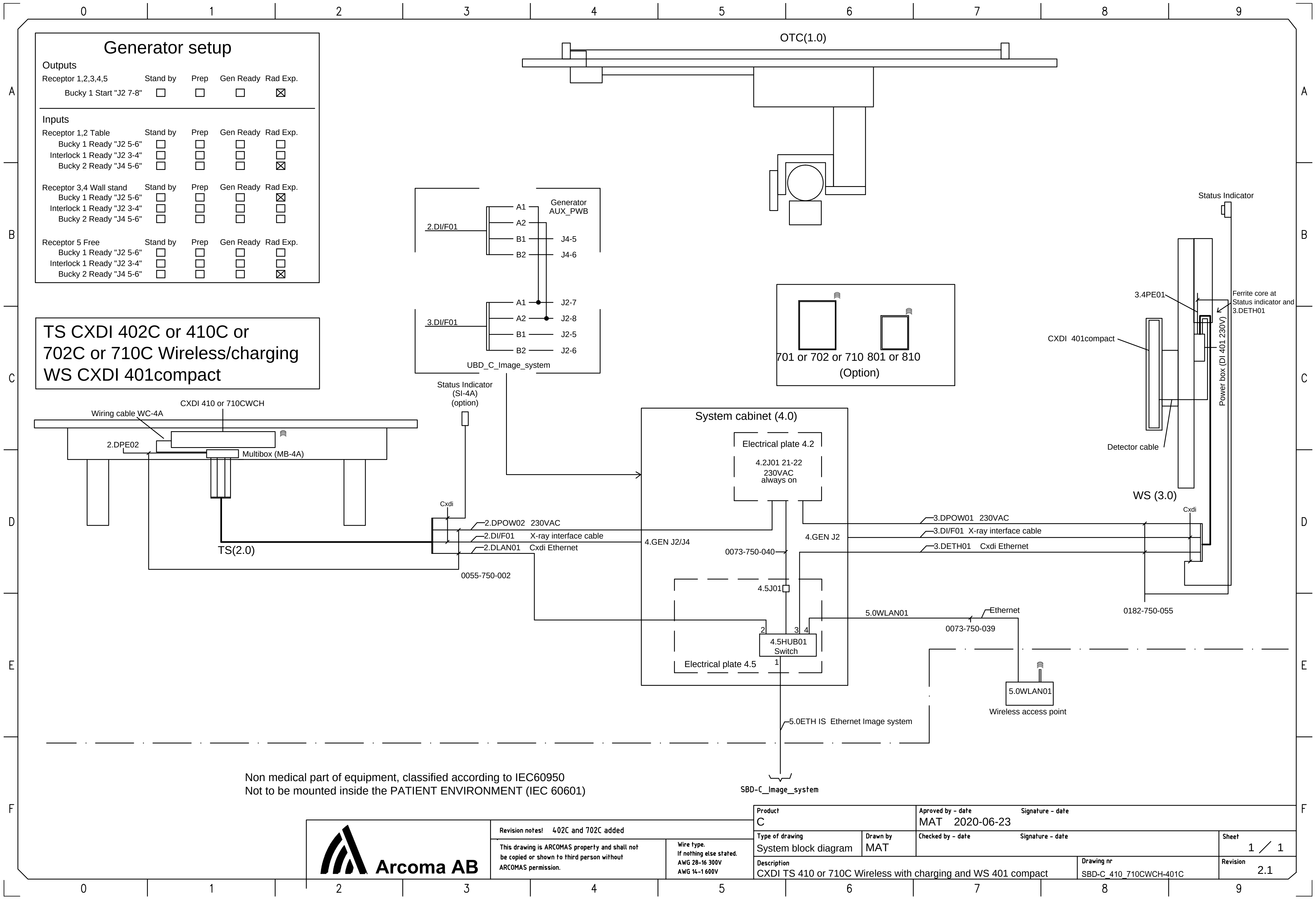
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless
WS CXDI 402C or 410C or 702C or 710C Wireless
CXDI 410 or 710CW
TS(2.0)
OTC(1.0)
4.DI/F01
A1 J2-7
A2 J2-8
B1 J2-3
B2 J2-4
Generator AUX_PWB
UBD_C_Image_system
701 or 702 or 710
801 or 810
(Option)
CXDI 410 or 710CW
WS (3.0)
System cabinet (4.0)
Multibox (MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
5
4
4.5HUB01 Switch
1
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
C
Aproved by - date
MAT 2020-06-23
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CXDI TS and WS 410 or 710C Wireless
Drawing nr
SBD-C_410_710CW-410_710CW
Revision
2.1



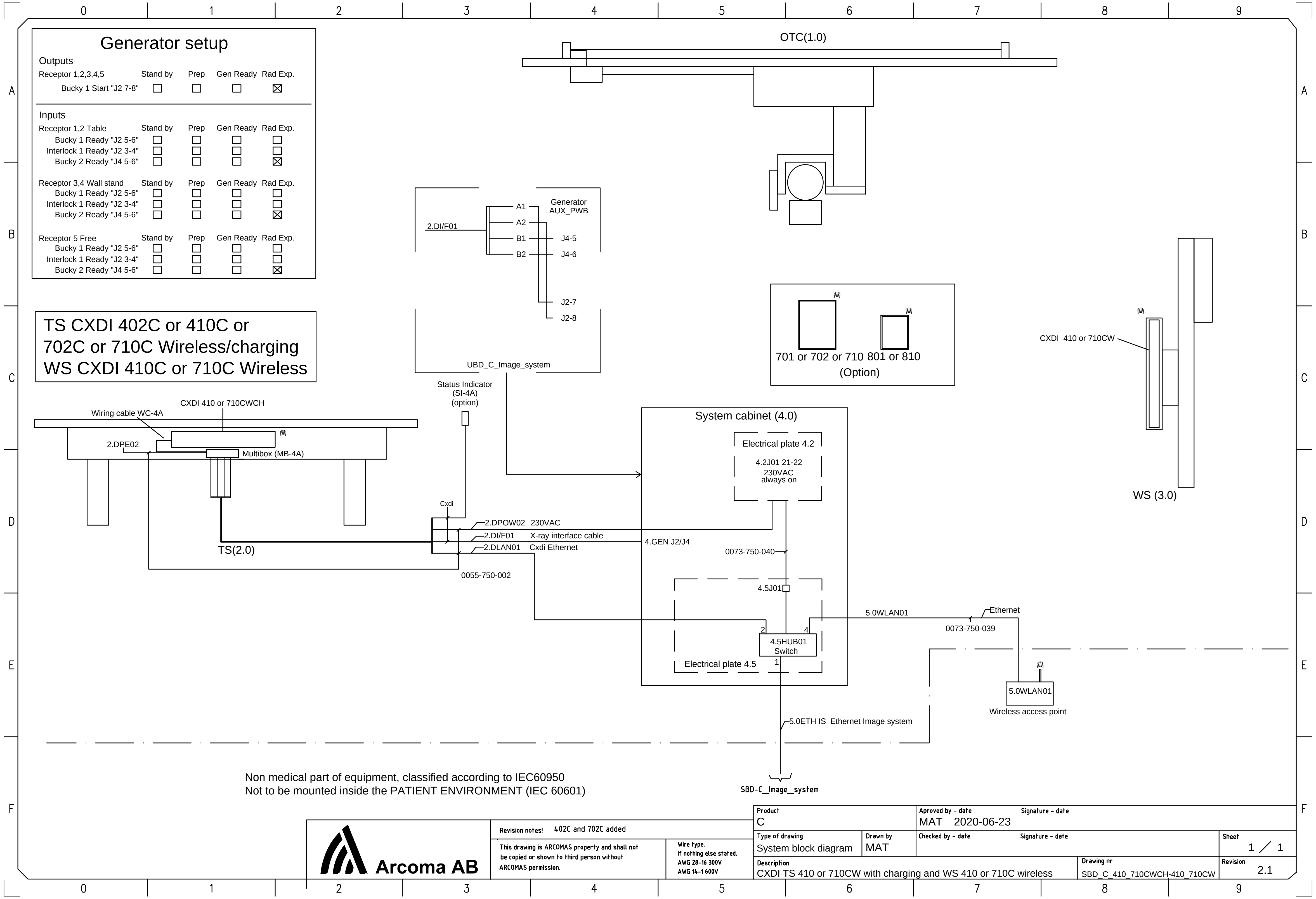
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand
Receptor 5 Free
TS CXDI 402C or 410C or 702C or 710C Wireless/charging
WS CXDI 402C or 410C or 702C or 710C Wireless/charging
OTC(1.0)
Generator AUX_PWB
2.DI/F01
3.DI/F01
Cable is connected for possible future use but not used in generator setup
Sync signal is disabled in WS multibox
UBD_C_Image_system
701 or 702 or 710 801 or 810
(Option)
Status Indicator (SI-4A) (option)
3.4PE01
CXDI 410 or 710CWCH
Multibox (MB-4A)
Sync signal is disabled at WS Multibox is only for charging Sw1 on.
Wiring cable WC-4A
WS (3.0)
CXDI 410-710CWCH
2.DPE02
Multibox (MB-4A)
TS(2.0)
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22 230VAC always on
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
4.GEN J2/J4
4.GEN J2
0073-750-040
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
CXDI
0182-750-055
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Type of drawing System block diagram
Drawn by MAT
Sheet 1 / 1
Description CXDI TS and WS 410 or 710C Wireless with charging
Drawing nr SBD-C_410_710CWCH-410_710CWCH
Revision 3.1

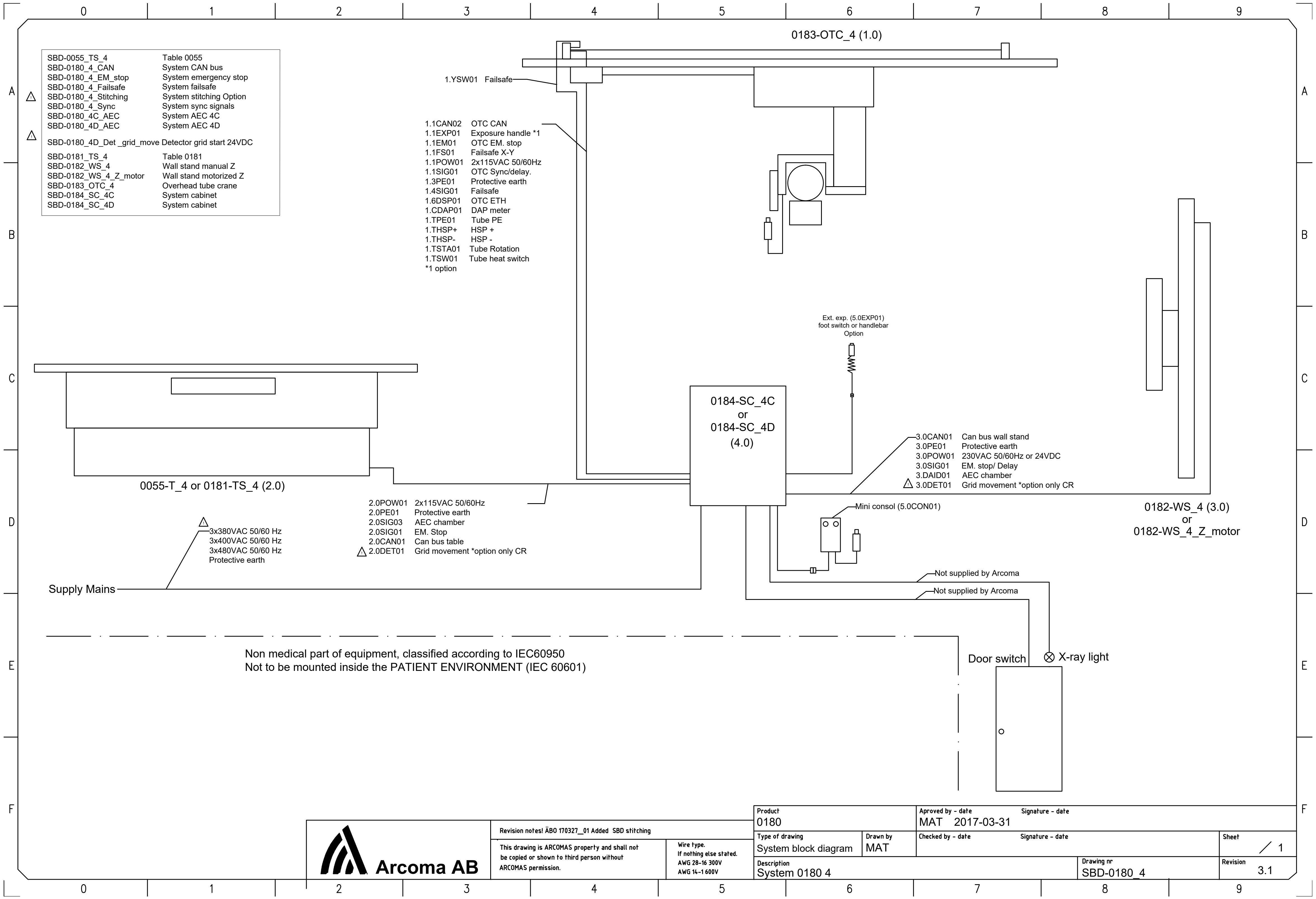


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or
702C or 710C Wireless
WS CXDI 402C or 410 or
702C or 710C Wireless/charging
OTC(1.0)
3.DI/F01
A1 J2-7
A2 J2-8
B1 J2-5
B2 J2-6
UBD_C_Image_system
701 or 702 or 710 801 or 810
(Option)
Status Indicator
(SI-4A)
(option)
3.4PE01
CXDI 410 or 710CWCH
Multibox (MB-4A)
Wiring cable WC-4A
WS (3.0)
CXDI 410 or 710CW
TS(2.0)
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC
always on
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
4.GEN J2
3.DETH01 Cxdi Ethernet
0073-750-040
CXDI
4.5J01
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01
Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
C
Aproved by - date Signature - date
MAT 2020-06-23
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date Signature - date
Sheet
1 / 1
Description
CXDI TS and WS 410 or 710C Wireless, WS with charging
Drawing nr
SBD-C_410_710CW-410_710CWCH
Revision
3.1

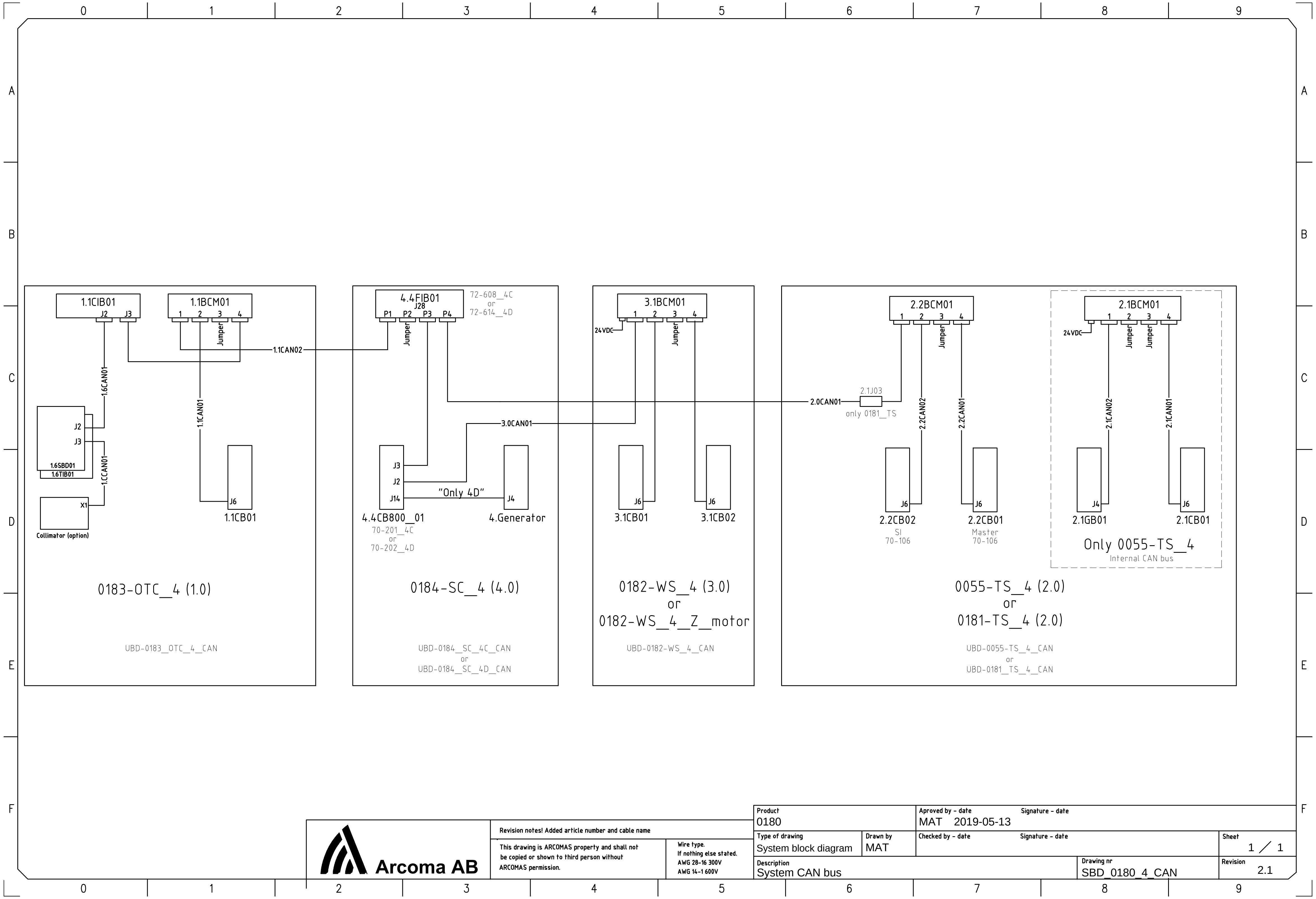


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless/charging WS CXDI 401compact
OTC(1.0)
Generator AUX_PWB
2.DI/F01
3.DI/F01
A1 A2 B1 B2
J4-5 J4-6 J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
Status Indicator (SI-4A) (option)
701 or 702 or 710 801 or 810 (Option)
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
CXDI 410 or 710CWCH
Wiring cable WC-4A
2.DPE02
Multibox (MB-4A)
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22 230VAC always on
4.GEN J2/J4
0073-750-040
4.GEN J2
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS 410 or 710C Wireless with charging and WS 401 compact
Drawing nr SBD-C_410_710CWCH-401C
Revision 2.1

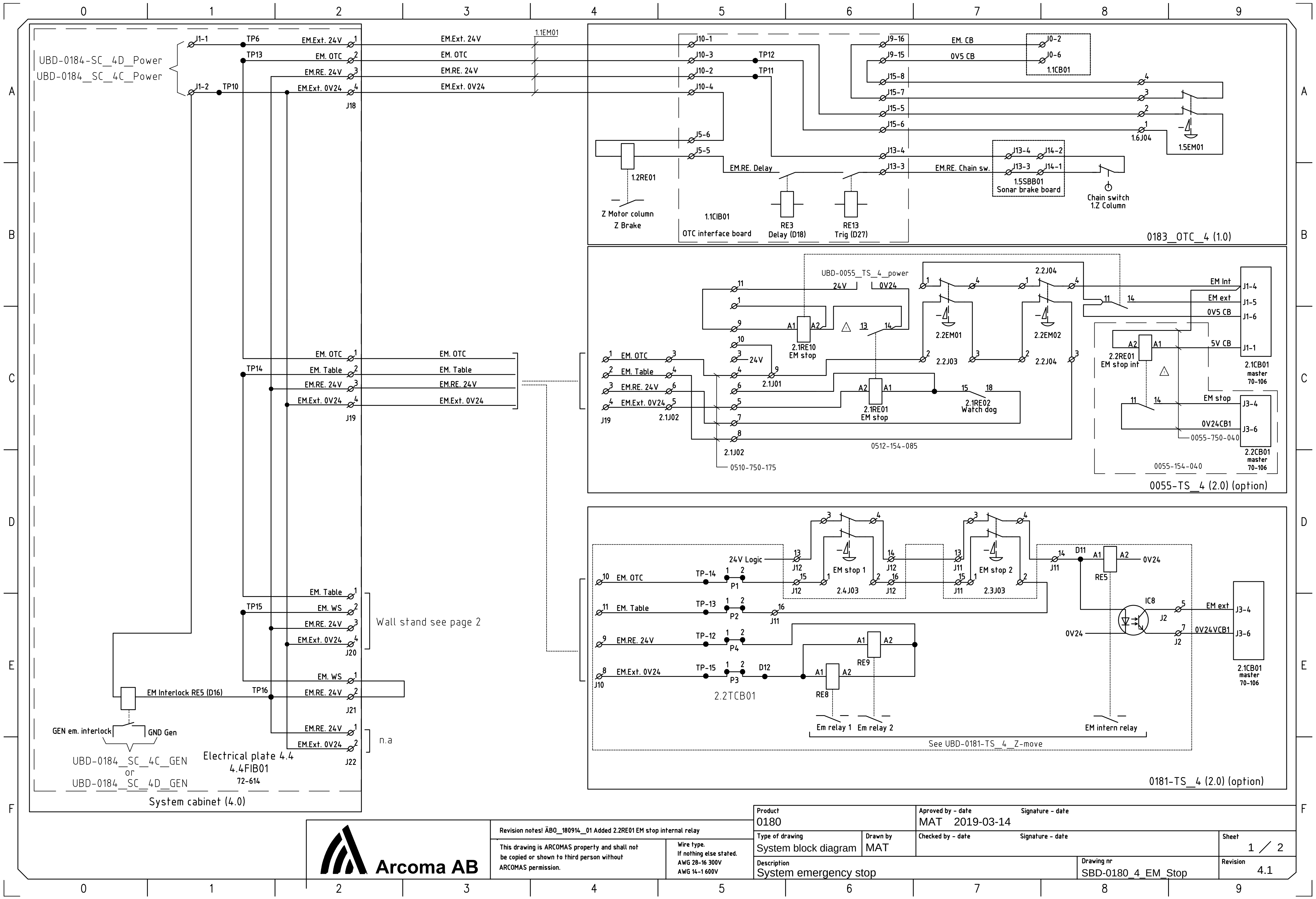

Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless/charging WS CXDI 410C or 710C Wireless
OTC(1.0)
2.DI/F01
A1
A2
B1
B2
Generator AUX_PWB
J4-5
J4-6
J2-7
J2-8
UBD_C_Image_system
701 or 702 or 710 801 or 810
(Option)
CXDI 410 or 710CW
WS (3.0)
Status Indicator (SI-4A) (option)
Wiring cable WC-4A
CXDI 410 or 710CWCH
2.DPE02
Multibox (MB-4A)
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
4.GEN J2/J4
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS 410 or 710CW with charging and WS 410 or 710C wireless
Drawing nr SBD_C_410_710CWCH-410_710CW
Revision 2.1



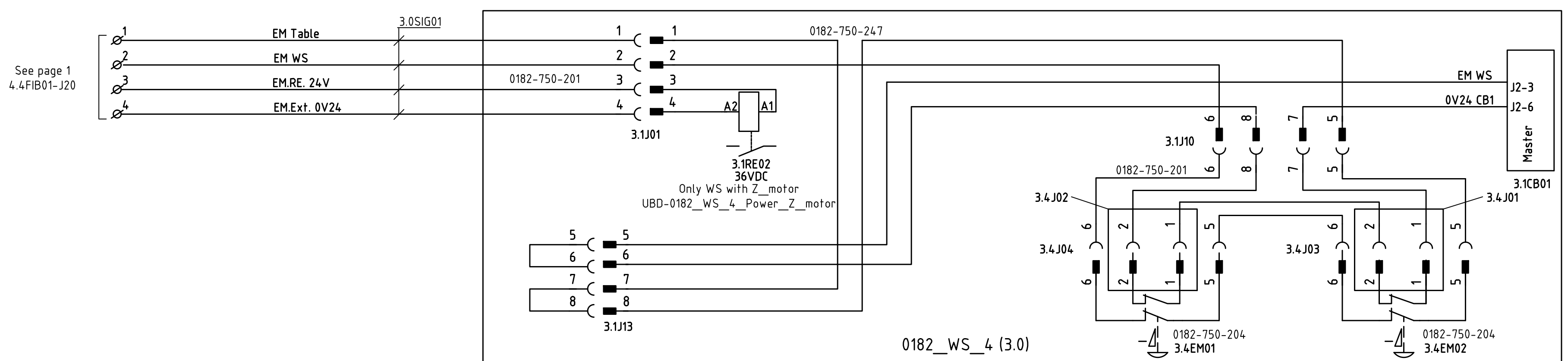
0183-OTC_4 (1.0)
SBD-0055_TS_4 Table 0055
SBD-0180_4_CAN System CAN bus
SBD-0180_4_EM_stop System emergency stop
SBD-0180_4_Failsafe System failsafe
SBD-0180_4_Stitching System stitching Option
SBD-0180_4_Sync System sync signals
SBD-0180_4C_AEC System AEC 4C
SBD-0180_4D_AEC System AEC 4D
SBD-0180_4D_Det _grid_move Detector grid start 24VDC
SBD-0181_TS_4 Table 0181
SBD-0182_WS_4 Wall stand manual Z
SBD-0182_WS_4_Z_motor Wall stand motorized Z
SBD-0183_OTC_4 Overhead tube crane
SBD-0184_SC_4C System cabinet
SBD-0184_SC_4D System cabinet
1.YSW01 Failsafe
1.1CAN02 OTC CAN
1.1EXP01 Exposure handle *1
1.1EM01 OTC EM. stop
1.1FS01 Failsafe X-Y
1.1POW01 2x115VAC 50/60Hz
1.1SIG01 OTC Sync/delay.
1.3PE01 Protective earth
1.4SIG01 Failsafe
1.6DSP01 OTC ETH
1.CDAP01 DAP meter
1.TPE01 Tube PE
1.THSP+ HSP +
1.THSP- HSP -
1.TSTA01 Tube Rotation
1.TSW01 Tube heat switch
*1 option
Ext. exp. (5.0EXP01)
foot switch or handlebar
Option
0184-SC_4C
or
0184-SC_4D
(4.0)
0055-T_4 or 0181-TS_4 (2.0)
3.0CAN01 Can bus wall stand
3.0PE01 Protective earth
3.0POW01 230VAC 50/60Hz or 24VDC
3.0SIG01 EM. stop/ Delay
3.DAID01 AEC chamber
3.0DET01 Grid movement *option only CR
2.0POW01 2x115VAC 50/60Hz
2.0PE01 Protective earth
2.0SIG03 AEC chamber
2.0SIG01 EM. Stop
2.0CAN01 Can bus table
2.0DET01 Grid movement *option only CR
Mini consol (5.0CON01)
0182-WS_4 (3.0)
or
0182-WS_4_Z_motor
3x380VAC 50/60 Hz
3x400VAC 50/60 Hz
3x480VAC 50/60 Hz
Protective earth
Supply Mains
Not supplied by Arcoma
Not supplied by Arcoma
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Door switch
X-ray light
Arcoma AB
Revision notes! ÄBO 170327_01 Added SBD stitching
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-03-31
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1
Description
System 0180 4
Drawing nr
SBD-0180_4
Revision
3.1



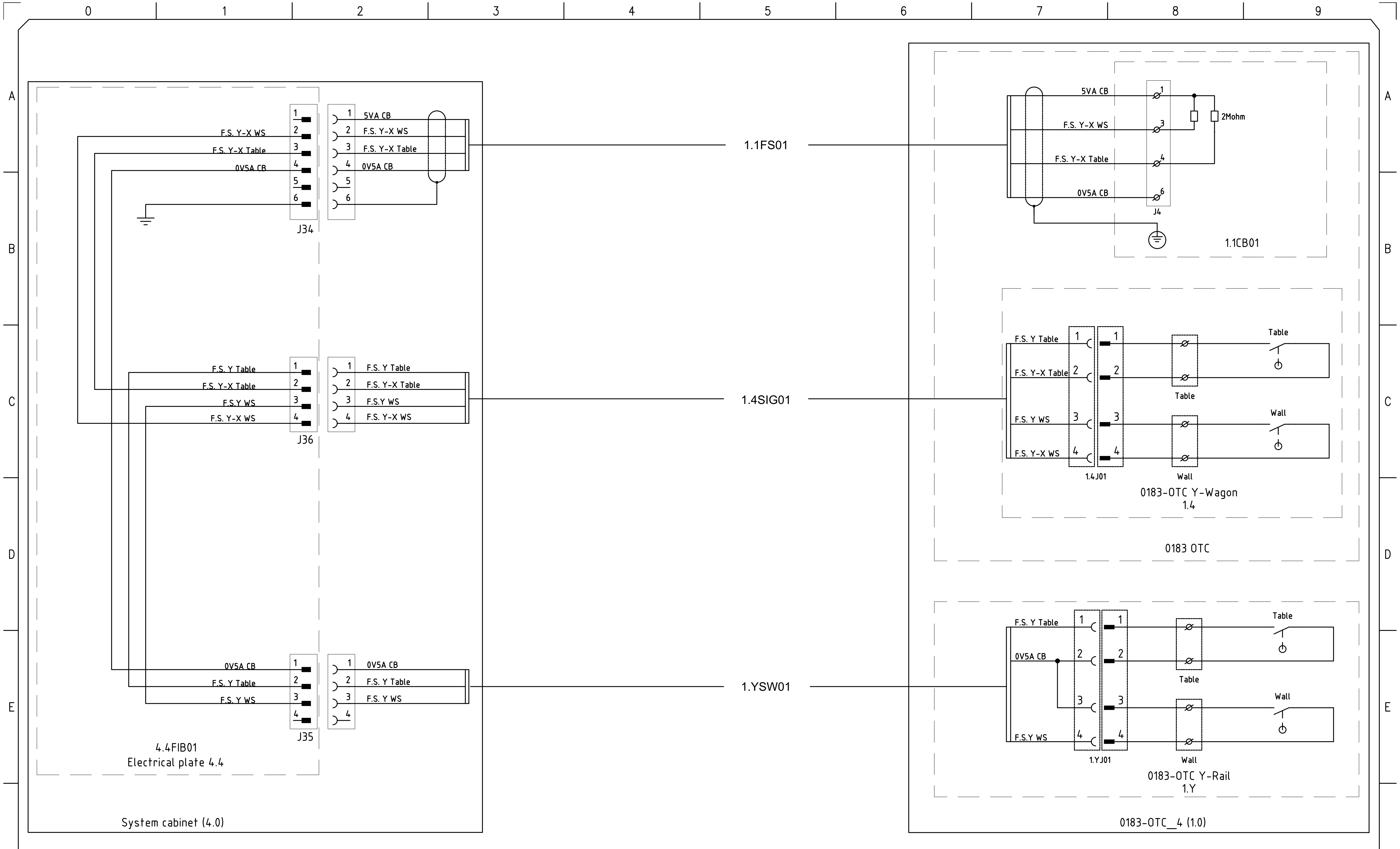
1.1CIB01
1.1BCM01
4.4FIB01
72-608_4C or 72-614_4D
3.1BCM01
2.2BCM01
2.1BCM01
24VDC
Jumper
1.1CAN02
1.6CAN01
1.1CAN01
1.CCAN01
2.0CAN01
3.0CAN01
2.1J03
only 0181_TS
2.2CAN02
2.2CAN01
2.1CAN02
2.1CAN01
1.6SBD01
1.6TIB01
Collimator (option)
1.1CB01
"Only 4D"
4.4CB800_01
70-201_4C or 70-202_4D
4.Generator
3.1CB01
3.1CB02
2.2CB02
SI 70-106
2.2CB01
Master 70-106
2.1GB01
2.1CB01
Only 0055-TS_4
Internal CAN bus
0183-OTC_4 (1.0)
UBD-0183_OTC_4_CAN
0184-SC_4 (4.0)
UBD-0184_SC_4C_CAN or UBD-0184_SC_4D_CAN
0182-WS_4 (3.0) or 0182-WS_4_Z_motor
UBD-0182-WS_4_CAN
0055-TS_4 (2.0) or 0181-TS_4 (2.0)
UBD-0055-TS_4_CAN or UBD-0181_TS_4_CAN
Arcoma AB
Revision notes! Added article number and cable name
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2019-05-13
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description System CAN bus
Drawing nr SBD_0180_4_CAN
Revision 2.1



UBD-0184-SC__4D_Power
UBD-0184__SC__4C_Power
EM.Ext. 24V
EM. OTC
EM.RE. 24V
EM.Ext. 0V24
1.1EM01
0183__OTC__4 (1.0)
OTC interface board
Z Motor column
Z Brake
RE3
Delay (D18)
RE13
Trig (D27)
1.5SBB01
Sonar brake board
Chain switch
1.Z Column
1.5EM01
1.1CB01
UBD-0055__TS__4__power
2.1RE10
EM stop
2.1RE01
EM stop
2.1RE02
Watch dog
2.2EM01
2.2EM02
2.2RE01
EM stop int
2.1CB01
master
70-106
2.2CB01
master
70-106
0055-TS__4 (2.0) (option)
Wall stand see page 2
n.a
EM Interlock RE5 (D16)
GEN em. interlock
GND Gen
UBD-0184__SC__4C__GEN
or
UBD-0184__SC__4D__GEN
Electrical plate 4.4
4.4FIB01
72-614
System cabinet (4.0)
24V Logic
EM stop 1
EM stop 2
2.2TCB01
Em relay 1
Em relay 2
EM intern relay
See UBD-0181-TS__4__Z-move
0181-TS__4 (2.0) (option)
Revision notes! ÄBO__180914__01 Added 2.2RE01 EM stop internal relay
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Arcoma AB
Product
0180
Aproved by - date
MAT 2019-03-14
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 2
Description
System emergency stop
Drawing nr
SBD-0180_4_EM_Stop
Revision
4.1



Arcoma AB	Revision notes! ÄB0180914_01		Product: 0180	Aproved by - date: MAT 2019-03-14 / Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Type of drawing: System block diagram / Drawn by: MAT	Checked by - date / Signature - date / Sheet: 2 / 2
			Description: System emergency stop	Drawing nr: SBD-0180_4_EM_Stop / Revision: 4.1

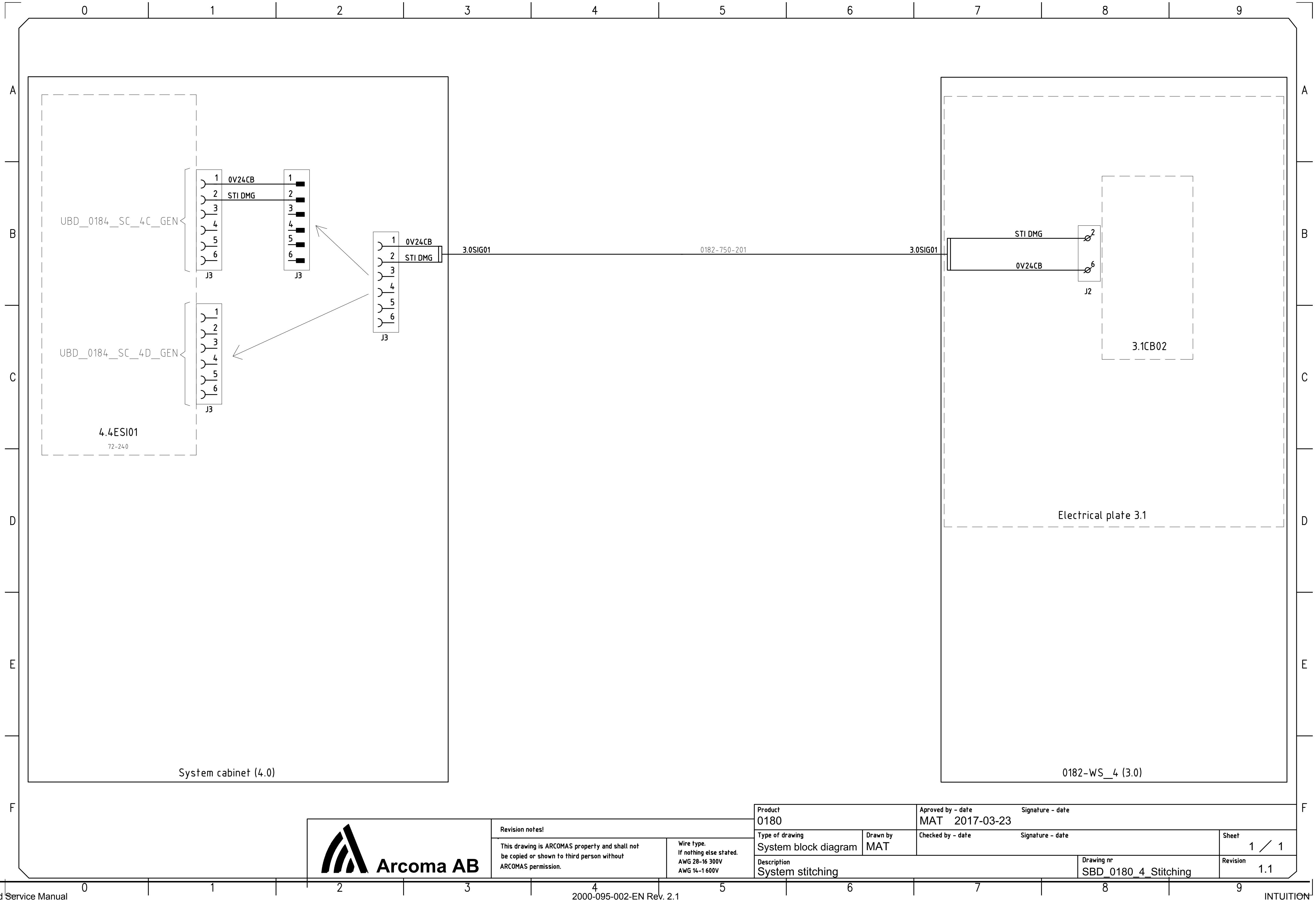


Product: 0180	Aproved by - date: MAT 2017-03-14	Signature - date		
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 1
Description: System fail safe switches			Drawing nr: SBD-0180_4_Failsafe	Revision: 1.1

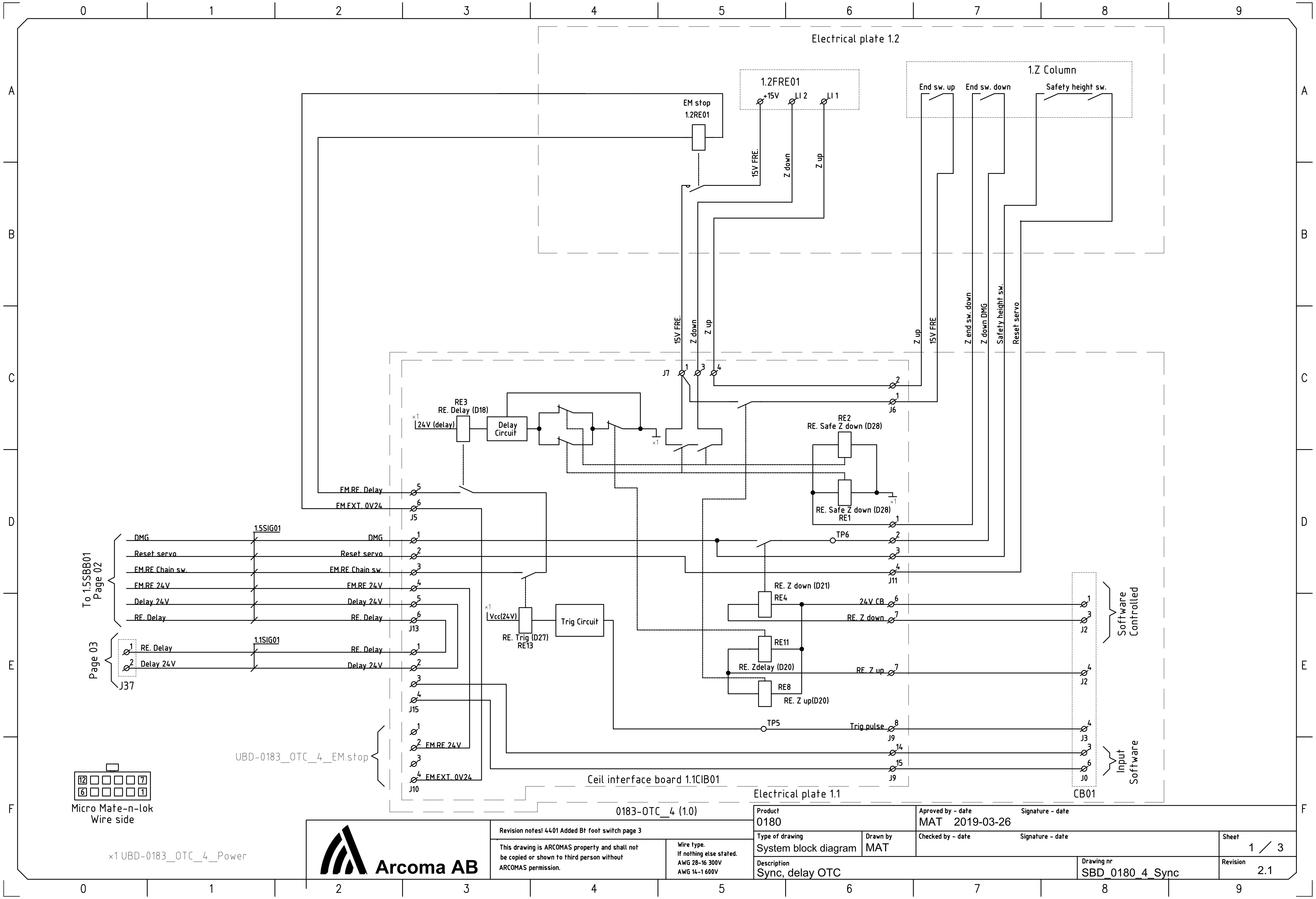
Arcoma AB

Revision notes!

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

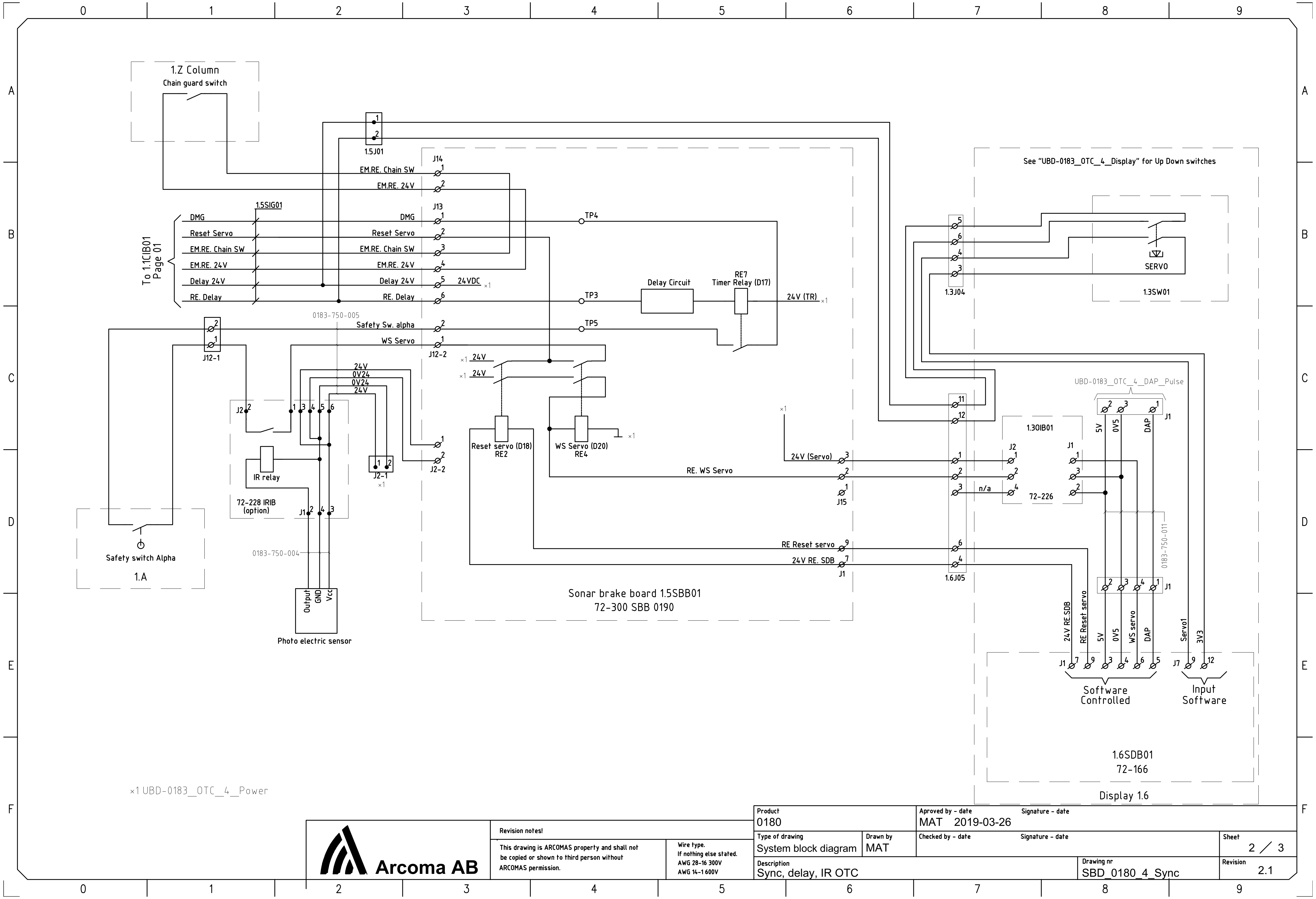


0 1 2 3 4 5 6 7 8 9
A B C D E F
UBD_0184_SC_4C_GEN
UBD_0184_SC_4D_GEN
0V24CB
STI DMG
J3
3.0SIG01
0182-750-201
J2
3.1CB02
4.4ESI01
72-240
Electrical plate 3.1
System cabinet (4.0)
0182-WS_4 (3.0)
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2017-03-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description System stitching
Drawing nr SBD_0180_4_Stitching
Revision 1.1



Arcoma AB	Revision notes! 4401 Added Bt foot switch page 3	
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product: 0180		Aproved by - date: MAT 2019-03-26	Signature - date	
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 3
Description: Sync, delay OTC			Drawing nr: SBD_0180_4_Sync	Revision: 2.1



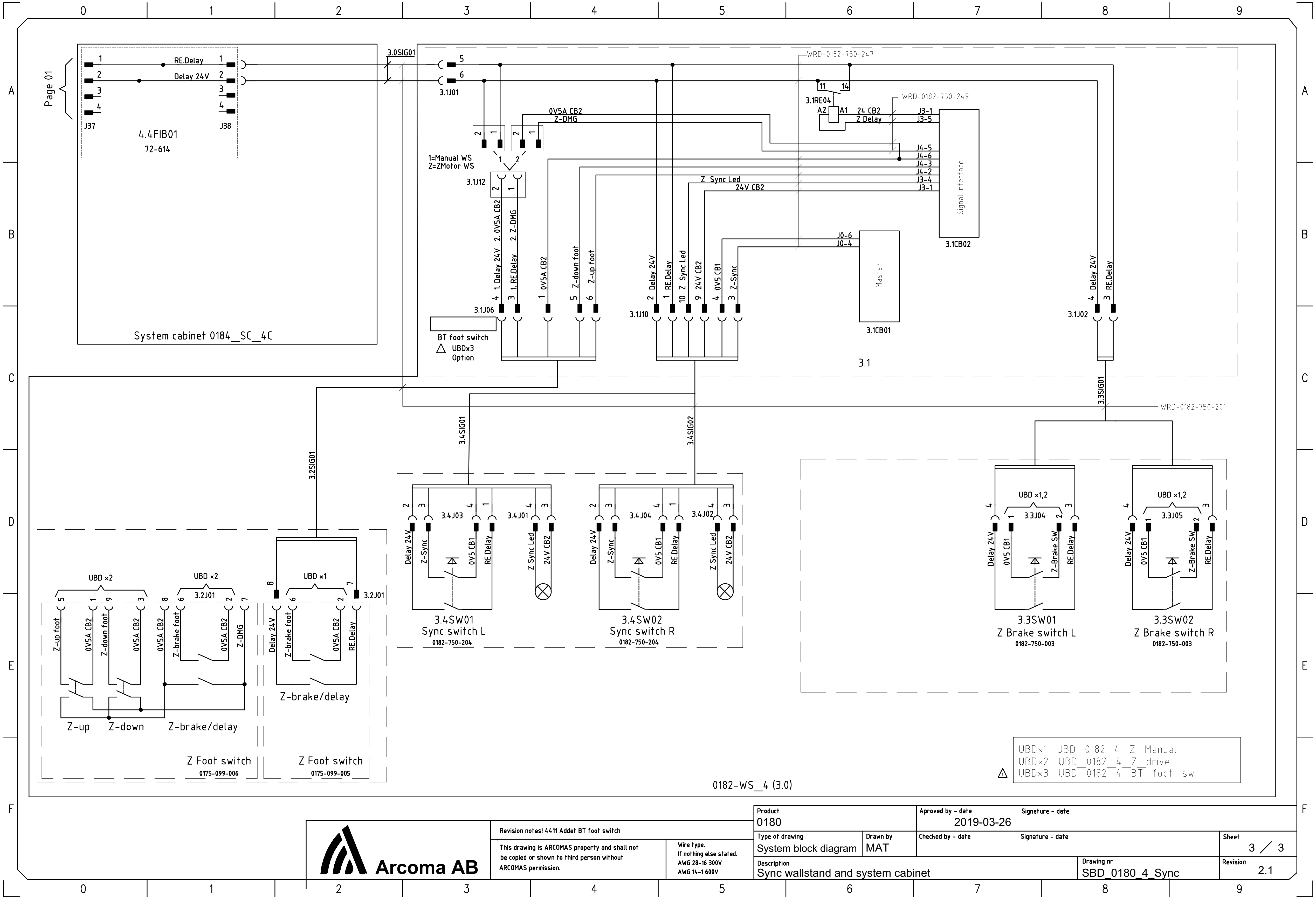
Arcoma AB

Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product	Aproved by - date	Signature - date	
0180	MAT 2019-03-26		
Type of drawing / Drawn by	Checked by - date	Signature - date	Sheet
System block diagram / MAT			2 / 3
Description		Drawing nr	Revision
Sync, delay, IR OTC		SBD_0180_4_Sync	2.1



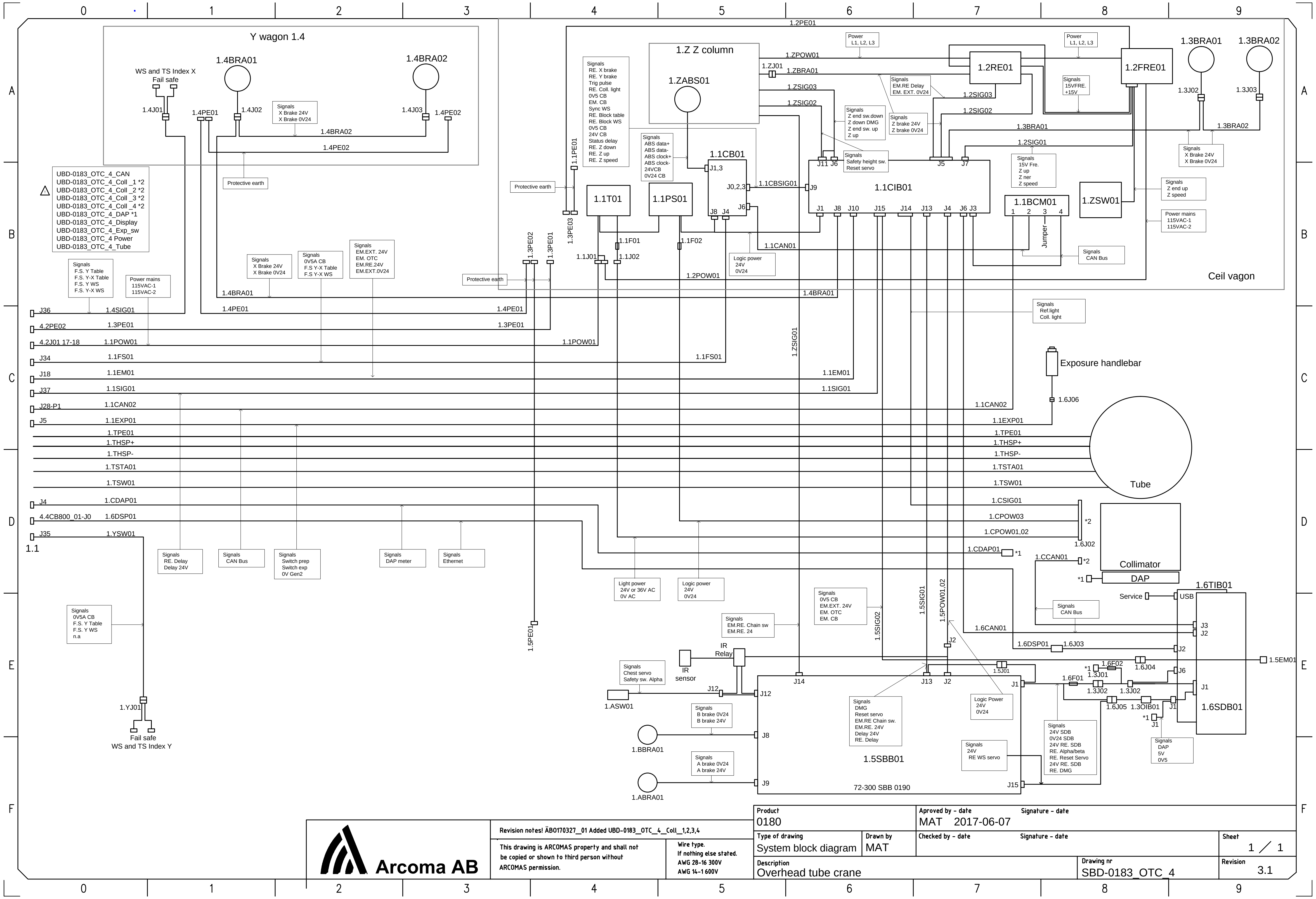
Product: 0180	Aproved by - date: 2019-03-26	Signature - date	
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Sheet: 3 / 3
Description: Sync wallstand and system cabinet		Drawing nr: SBD_0180_4_Sync	Revision: 2.1

Revision notes! 4411 Addet BT foot switch

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Arcoma AB



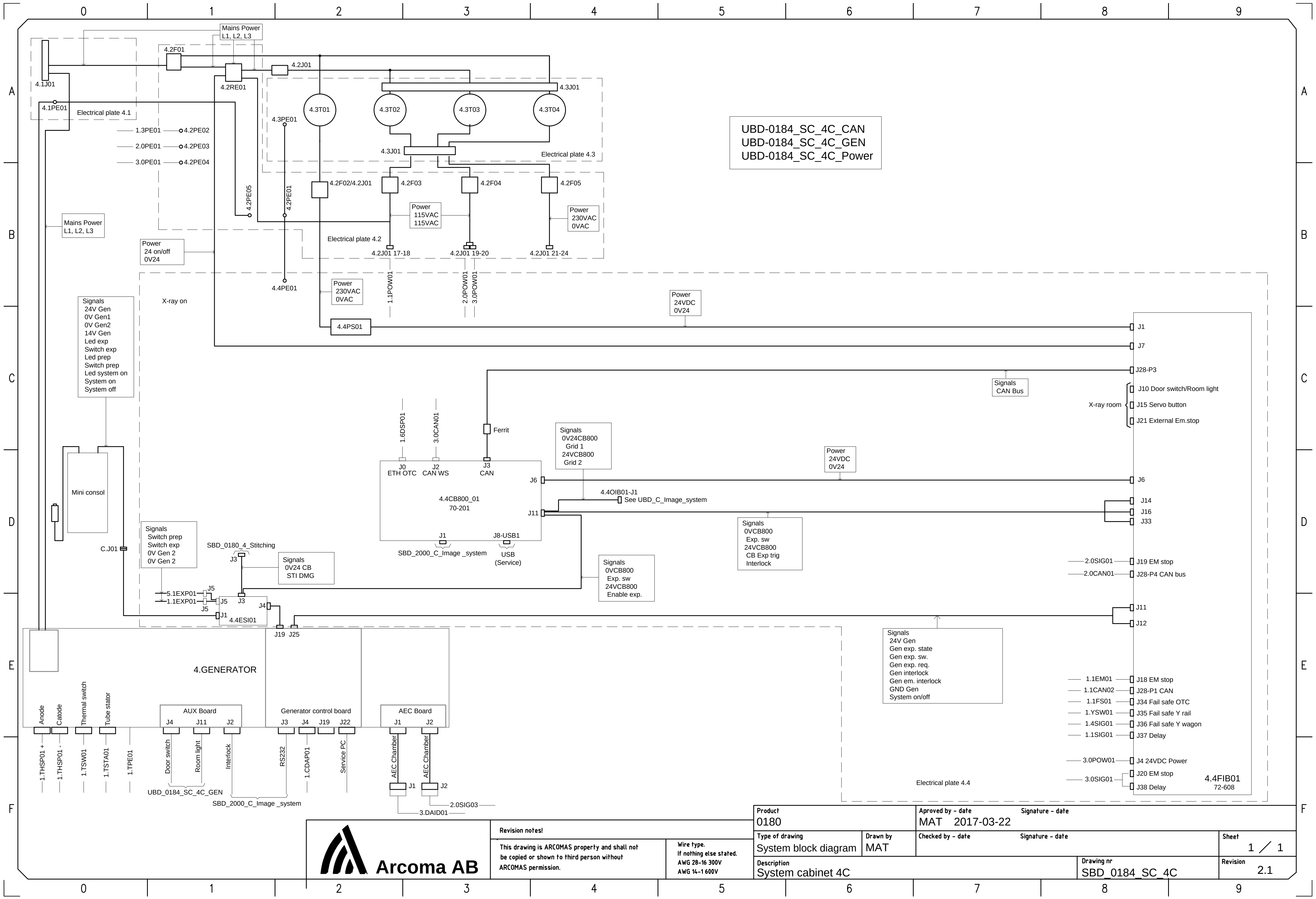
Product	0180	Aproved by - date: MAT 2017-06-07	Signature - date	
Type of drawing	System block diagram	Drawn by: MAT	Checked by - date	Sheet 1 / 1
Description	Overhead tube crane	Drawing nr: SBD-0183_OTC_4		Revision 3.1

Revision notes! ÄBO170327_01 Added UBD-0183_OTC_4_Coll_1,2,3,4

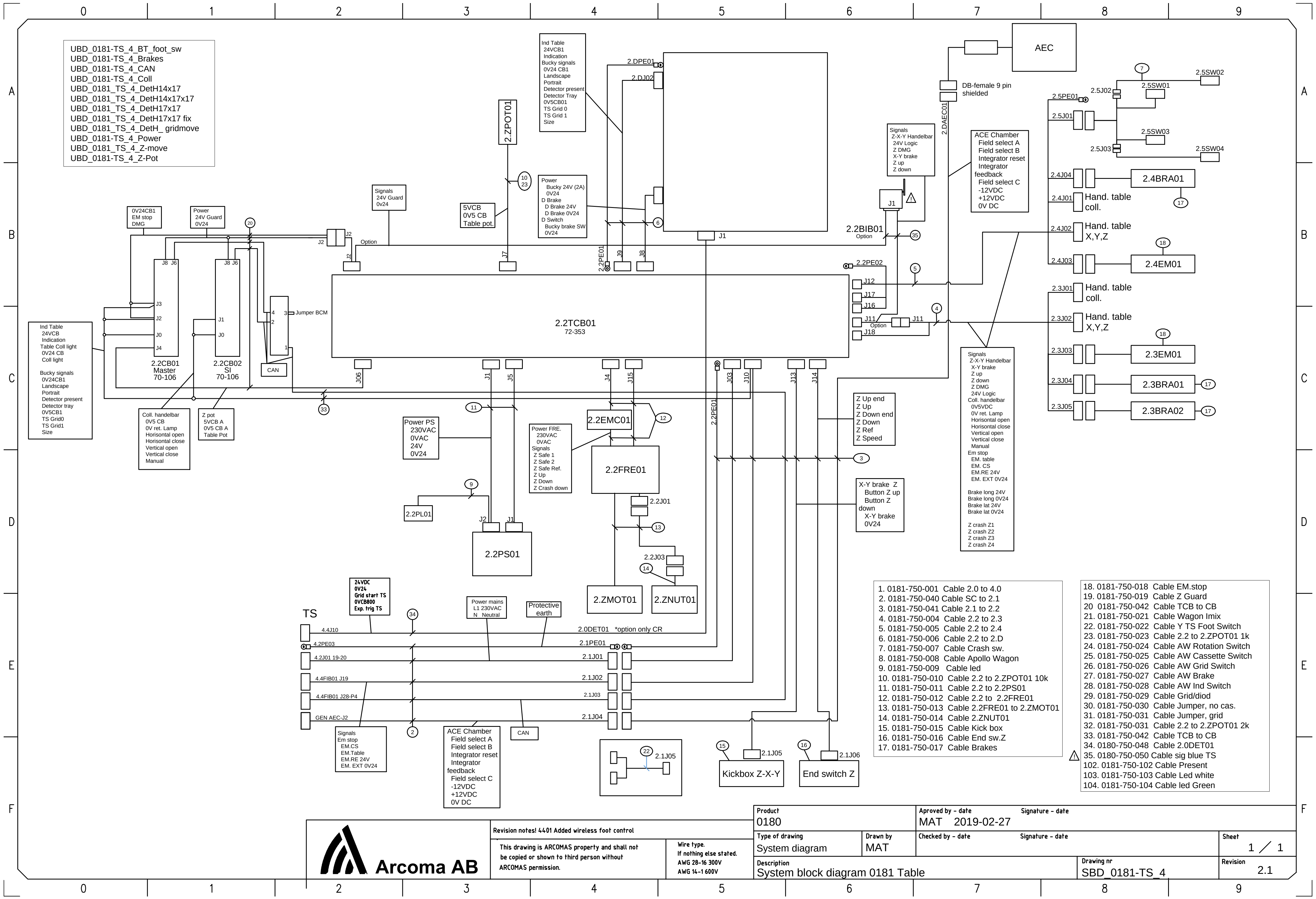
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

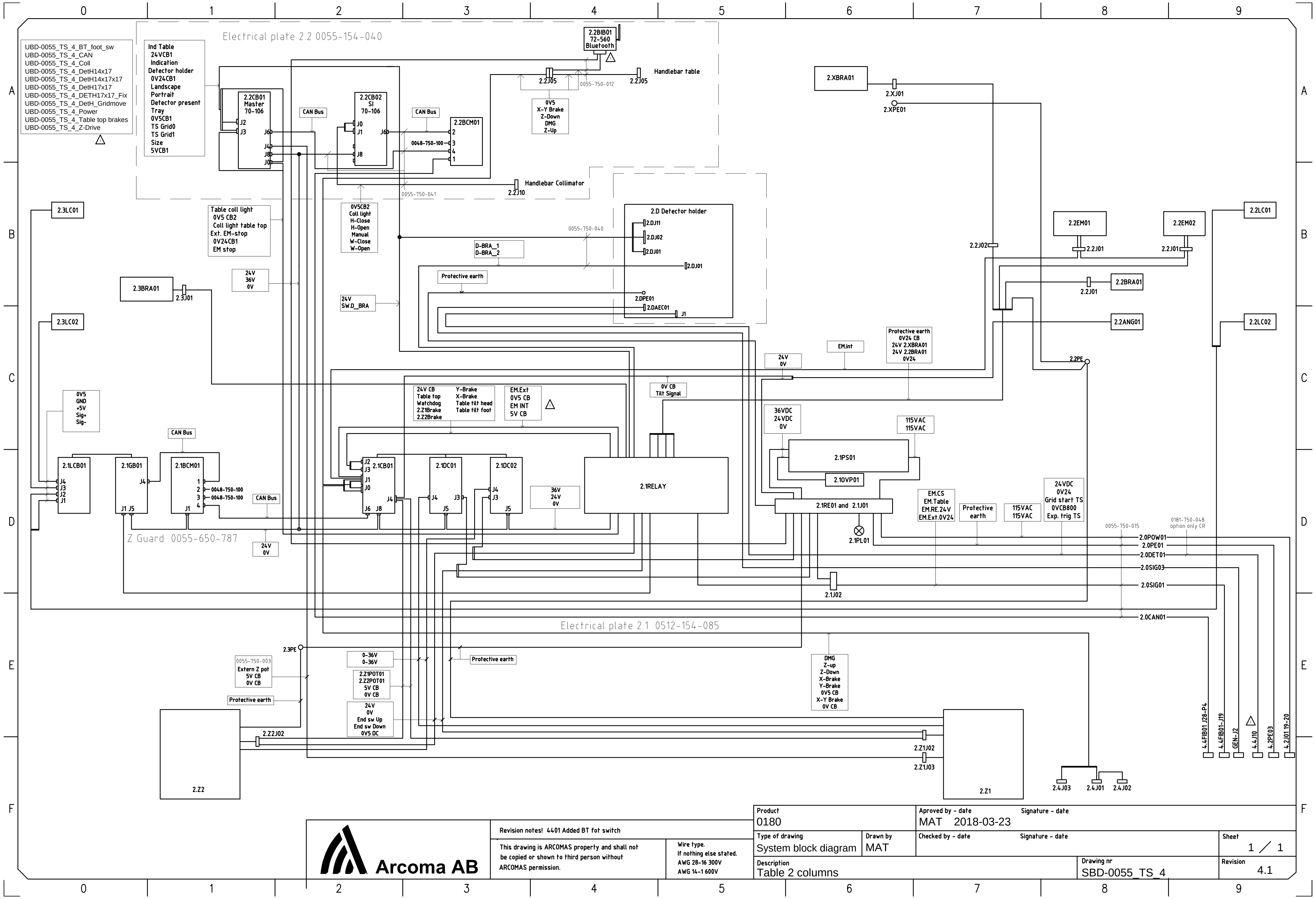
Arcoma AB



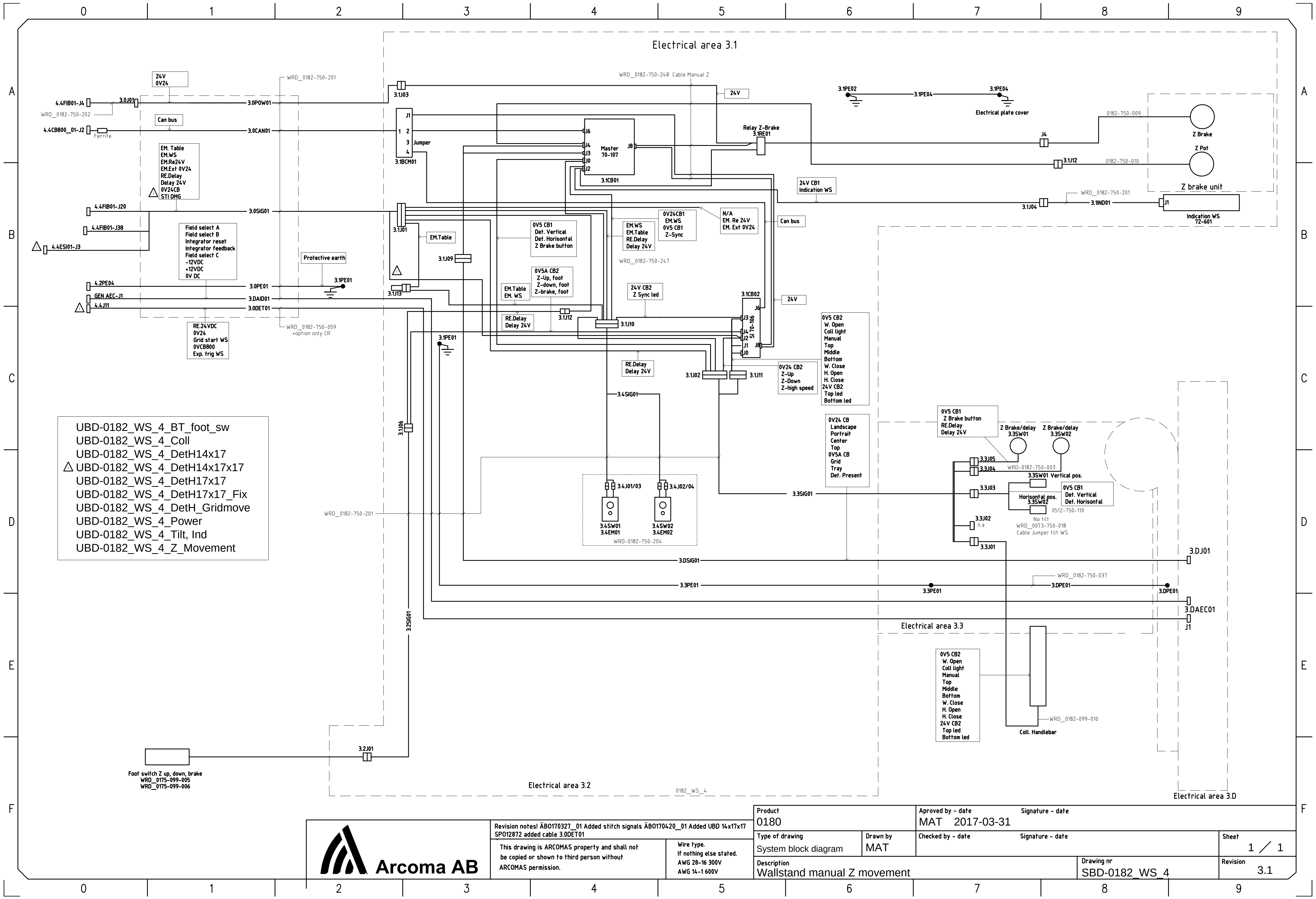
UBD-0184_SC_4C_CAN
UBD-0184_SC_4C_GEN
UBD-0184_SC_4C_Power
Mains Power L1, L2, L3
4.2F01
4.2J01
4.2RE01
4.1J01
4.1PE01
Electrical plate 4.1
4.3J01
4.3T01
4.3T02
4.3T03
4.3T04
4.3PE01
Electrical plate 4.3
Electrical plate 4.2
4.2F02/4.2J01
4.2F03
4.2F04
4.2F05
4.4PS01
4.4PE01
X-ray on
Mini consol
4.GENERATOR
AUX Board
Generator control board
AEC Board
4.4CB800_01
70-201
4.4ESI01
SBD_0180_4_Stitching
SBD_2000_C_Image _system
UBD_0184_SC_4C_GEN
X-ray room
J10 Door switch/Room light
J15 Servo button
J21 External Em.stop
J19 EM stop
J28-P4 CAN bus
J18 EM stop
J28-P1 CAN
J34 Fail safe OTC
J35 Fail safe Y rail
J36 Fail safe Y wagon
J37 Delay
J4 24VDC Power
J20 EM stop
J38 Delay
4.4FIB01
72-608
Electrical plate 4.4
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product: 0180
Aproved by - date: MAT 2017-03-22
Type of drawing: System block diagram
Drawn by: MAT
Sheet: 1 / 1
Description: System cabinet 4C
Drawing nr: SBD_0184_SC_4C
Revision: 2.1



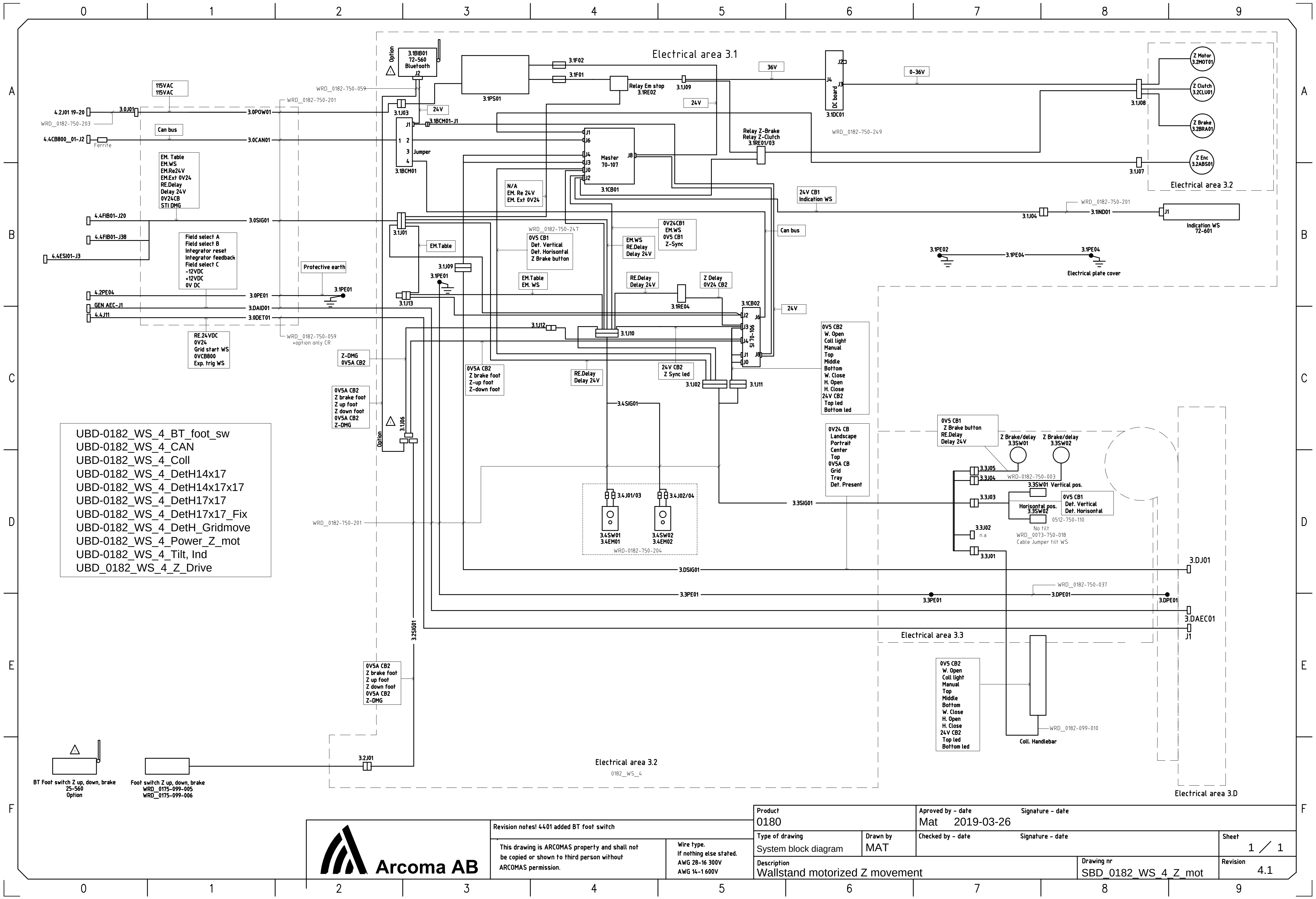
UBD_0181-TS_4_BT_foot_sw
UBD_0181-TS_4_Brakes
UBD_0181-TS_4_CAN
UBD_0181-TS_4_Coll
UBD_0181_TS_4_DetH14x17
UBD_0181_TS_4_DetH14x17x17
UBD_0181_TS_4_DetH17x17
UBD_0181_TS_4_DetH17x17 fix
UBD_0181_TS_4_DetH_ gridmove
UBD_0181-TS_4_Power
UBD_0181-TS_4_Z-move
UBD_0181-TS_4_Z-Pot
2.2TCB01
72-353
2.2CB01
Master
70-106
2.2CB02
SI
70-106
2.2BIB01
2.2EMC01
2.2FRE01
2.2PS01
2.2PL01
2.ZPOT01
2.ZMOT01
2.ZNUT01
AEC
DB-female 9 pin shielded
2.4BRA01
2.4EM01
2.3EM01
2.3BRA01
2.3BRA02
Hand. table coll.
Hand. table X,Y,Z
Kickbox Z-X-Y
End switch Z
TS
1. 0181-750-001 Cable 2.0 to 4.0
2. 0181-750-040 Cable SC to 2.1
3. 0181-750-041 Cable 2.1 to 2.2
4. 0181-750-004 Cable 2.2 to 2.3
5. 0181-750-005 Cable 2.2 to 2.4
6. 0181-750-006 Cable 2.2 to 2.D
7. 0181-750-007 Cable Crash sw.
8. 0181-750-008 Cable Apollo Wagon
9. 0181-750-009 Cable led
10. 0181-750-010 Cable 2.2 to 2.ZPOT01 10k
11. 0181-750-011 Cable 2.2 to 2.2PS01
12. 0181-750-012 Cable 2.2 to 2.2FRE01
13. 0181-750-013 Cable 2.2FRE01 to 2.ZMOT01
14. 0181-750-014 Cable 2.ZNUT01
15. 0181-750-015 Cable Kick box
16. 0181-750-016 Cable End sw.Z
17. 0181-750-017 Cable Brakes
18. 0181-750-018 Cable EM.stop
19. 0181-750-019 Cable Z Guard
20 0181-750-042 Cable TCB to CB
21. 0181-750-021 Cable Wagon Imix
22. 0181-750-022 Cable Y TS Foot Switch
23. 0181-750-023 Cable 2.2 to 2.ZPOT01 1k
24. 0181-750-024 Cable AW Rotation Switch
25. 0181-750-025 Cable AW Cassette Switch
26. 0181-750-026 Cable AW Grid Switch
27. 0181-750-027 Cable AW Brake
28. 0181-750-028 Cable AW Ind Switch
29. 0181-750-029 Cable Grid/diod
30. 0181-750-030 Cable Jumper, no cas.
31. 0181-750-031 Cable Jumper, grid
32. 0181-750-031 Cable 2.2 to 2.ZPOT01 2k
33. 0181-750-042 Cable TCB to CB
34. 0180-750-048 Cable 2.0DET01
35. 0180-750-050 Cable sig blue TS
102. 0181-750-102 Cable Present
103. 0181-750-103 Cable Led white
104. 0181-750-104 Cable led Green
Arcoma AB
Revision notes! 4401 Added wireless foot control
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2019-02-27
Signature - date
Type of drawing
System diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
System block diagram 0181 Table
Drawing nr
SBD_0181-TS_4
Revision
2.1



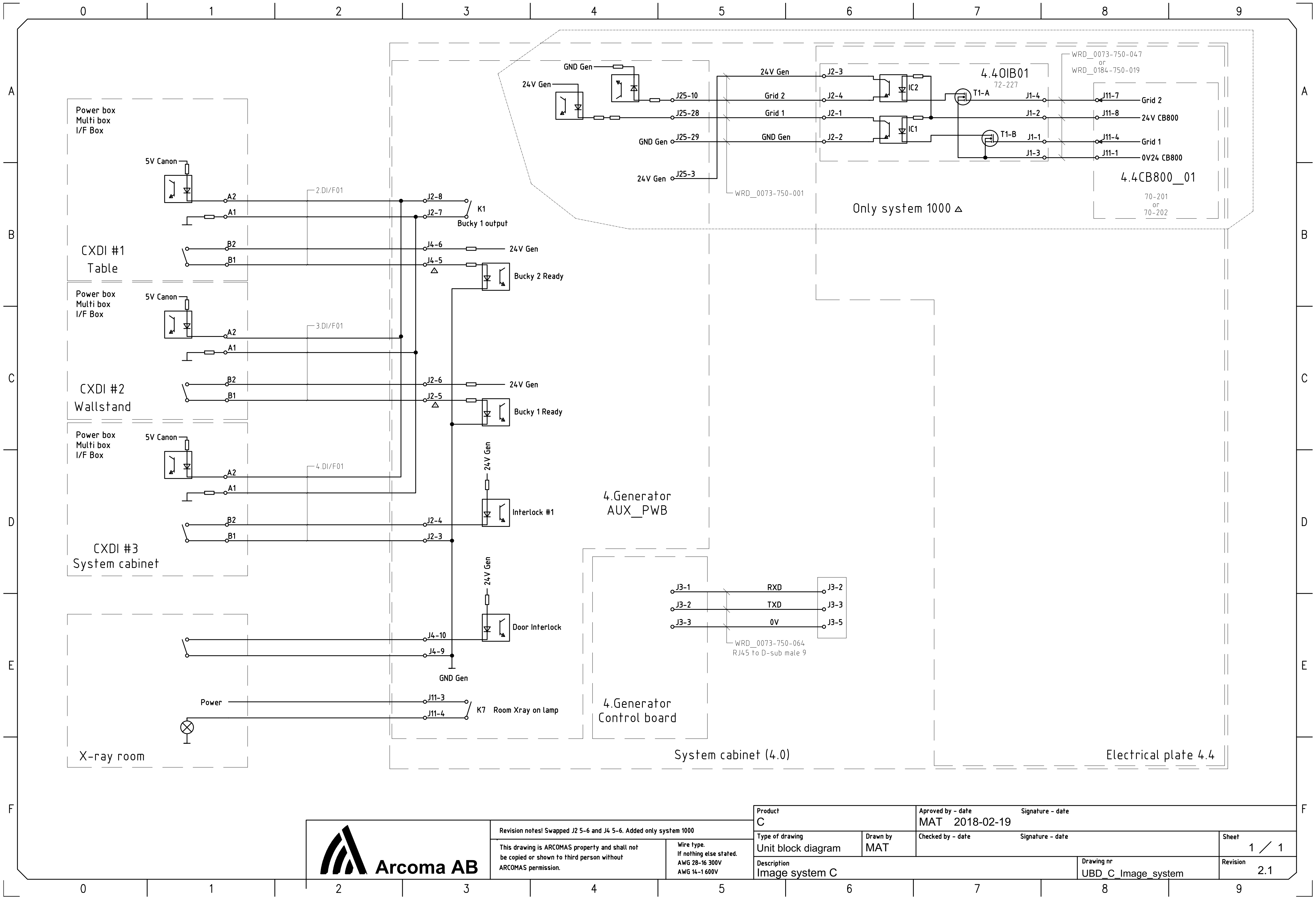
Electrical plate 2.2 0055-154-040
Electrical plate 2.1 0512-154-085
Z Guard 0055-650-787
2.2BIB01 72-560 Bluetooth
Handlebar table
Handlebar Collimator
2.2CB01 Master 70-106
2.2CB02 SI 70-106
2.2BCM01
2.D Detector holder
2.1CB01
2.1RELAY
2.1PS01
2.1RE01 and 2.1J01
2.Z1
2.Z2
Revision notes! 4401 Added BT fot switch
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Arcoma AB
Product
0180
Aproved by - date
MAT 2018-03-23
Type of drawing
System block diagram
Drawn by
MAT
Sheet
1 / 1
Description
Table 2 columns
Drawing nr
SBD-0055_TS_4
Revision
4.1



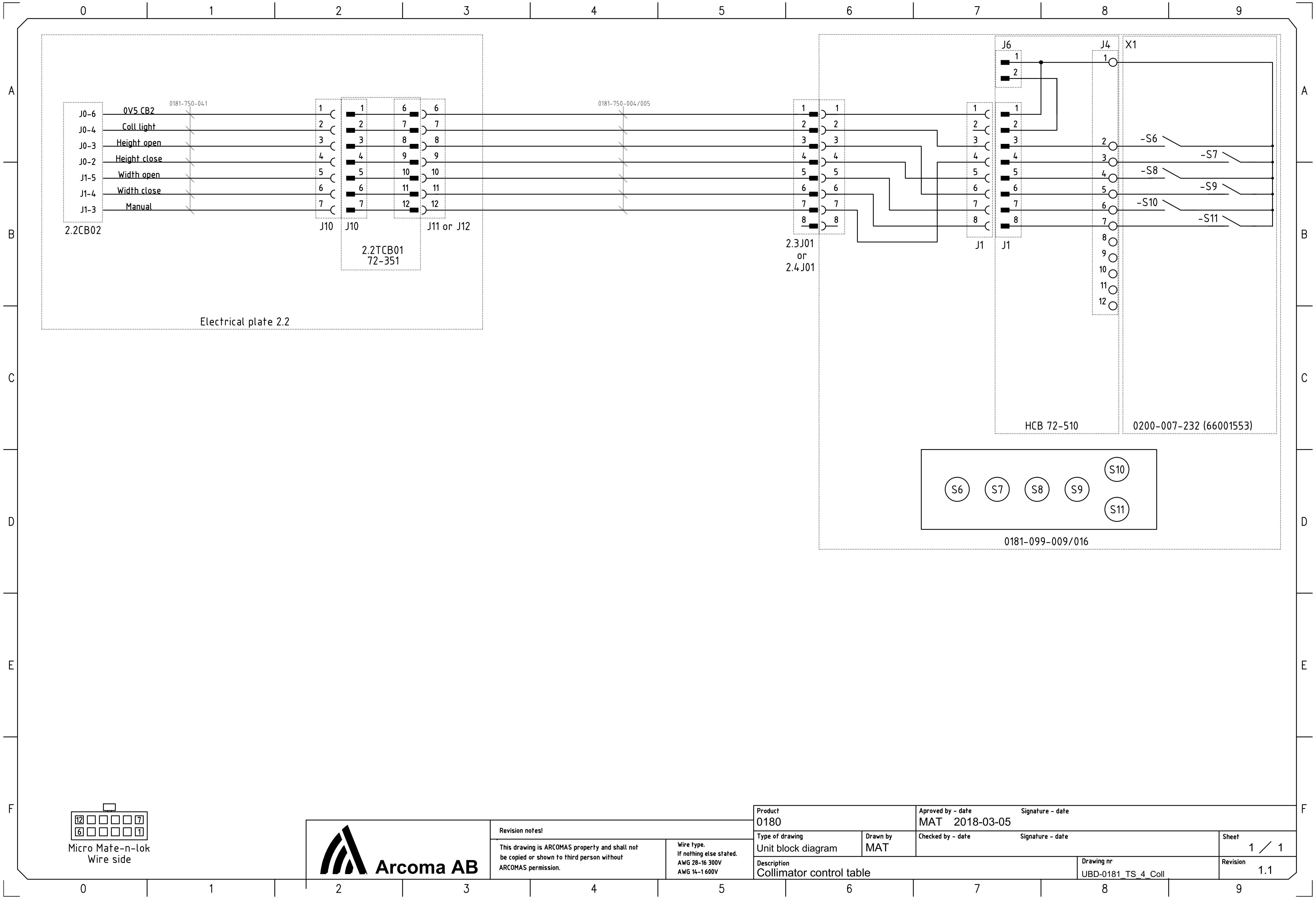
Electrical area 3.1
Electrical area 3.2
Electrical area 3.3
Electrical area 3.D
Master 70-107
Relay Z-Brake
Z Brake
Z Pot
Z brake unit
Indication WS 72-601
Protective earth
Electrical plate cover
Foot switch Z up, down, brake
Coll. Handlebar
UBD-0182_WS_4_BT_foot_sw
UBD-0182_WS_4_Coll
UBD-0182_WS_4_DetH14x17
UBD-0182_WS_4_DetH14x17x17
UBD-0182_WS_4_DetH17x17
UBD-0182_WS_4_DetH17x17_Fix
UBD-0182_WS_4_DetH_Gridmove
UBD-0182_WS_4_Power
UBD-0182_WS_4_Tilt, Ind
UBD-0182_WS_4_Z_Movement
Arcoma AB
Revision notes! ÄB0170327__01 Added stitch signals ÄB0170420__01 Added UBD 14x17x17
SP012872 added cable 3.0DET01
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-03-31
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Wallstand manual Z movement
Drawing nr
SBD-0182_WS_4
Revision
3.1



Electrical area 3.1
Electrical area 3.2
Electrical area 3.3
Electrical area 3.D
UBD-0182_WS_4_BT_foot_sw
UBD-0182_WS_4_CAN
UBD-0182_WS_4_Coll
UBD-0182_WS_4_DetH14x17
UBD-0182_WS_4_DetH14x17x17
UBD-0182_WS_4_DetH17x17
UBD-0182_WS_4_DetH17x17_Fix
UBD-0182_WS_4_DetH_Gridmove
UBD-0182_WS_4_Power_Z_mot
UBD-0182_WS_4_Tilt, Ind
UBD_0182_WS_4_Z_Drive
BT Foot switch Z up, down, brake
Foot switch Z up, down, brake
Coll. Handlebar
Electrical plate cover
Arcoma AB
Revision notes! 4401 added BT foot switch
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
Mat 2019-03-26
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Wallstand motorized Z movement
Drawing nr
SBD_0182_WS_4_Z_mot
Revision
4.1



Power box
Multi box
I/F Box
5V Canon
CXDI #1
Table
CXDI #2
Wallstand
CXDI #3
System cabinet
X-ray room
Power
K1
Bucky 1 output
24V Gen
Bucky 2 Ready
Bucky 1 Ready
Interlock #1
Door Interlock
GND Gen
K7 Room Xray on lamp
4.Generator
AUX_PWB
4.Generator
Control board
System cabinet (4.0)
Electrical plate 4.4
Only system 1000
4.4OIB01
72-227
4.4CB800_01
70-201
or
70-202
WRD_0073-750-047
or
WRD_0184-750-019
WRD_0073-750-001
WRD_0073-750-064
RJ45 to D-sub male 9
Grid 2
24V CB800
Grid 1
0V24 CB800
RXD
TXD
0V
Revision notes! Swapped J2 5-6 and J4 5-6. Added only system 1000
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Arcoma AB
Product
C
Aproved by - date
MAT 2018-02-19
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Image system C
Drawing nr
UBD_C_Image_system
Revision
2.1



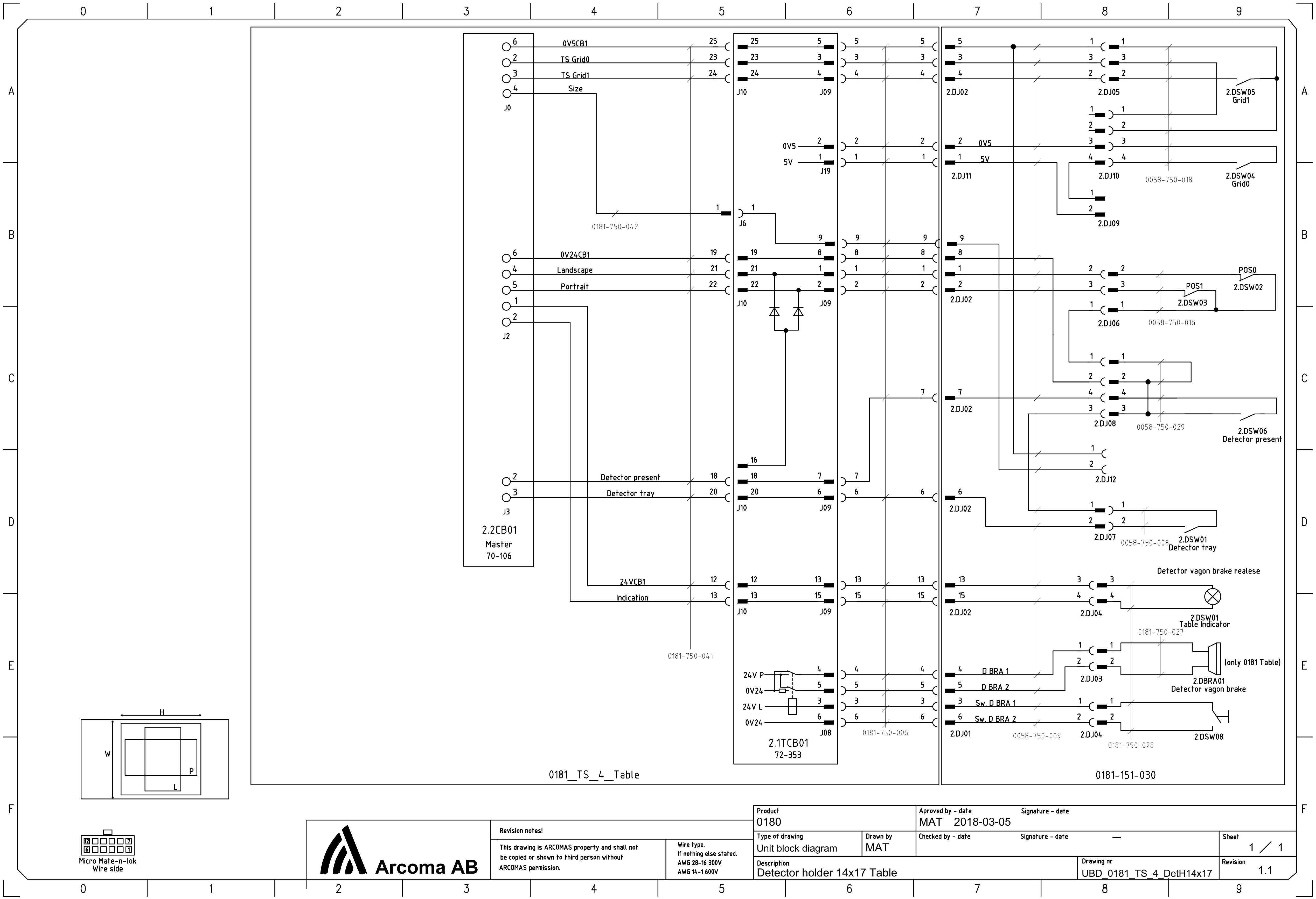
Arcoma AB

Product 0180		Aproved by - date MAT 2018-03-05	Signature - date
Type of drawing Unit block diagram	Drawn by MAT	Checked by - date	Signature - date / Sheet 1 / 1
Description Collimator control table		Drawing nr UBD-0181_TS_4_Coll	Revision 1.1

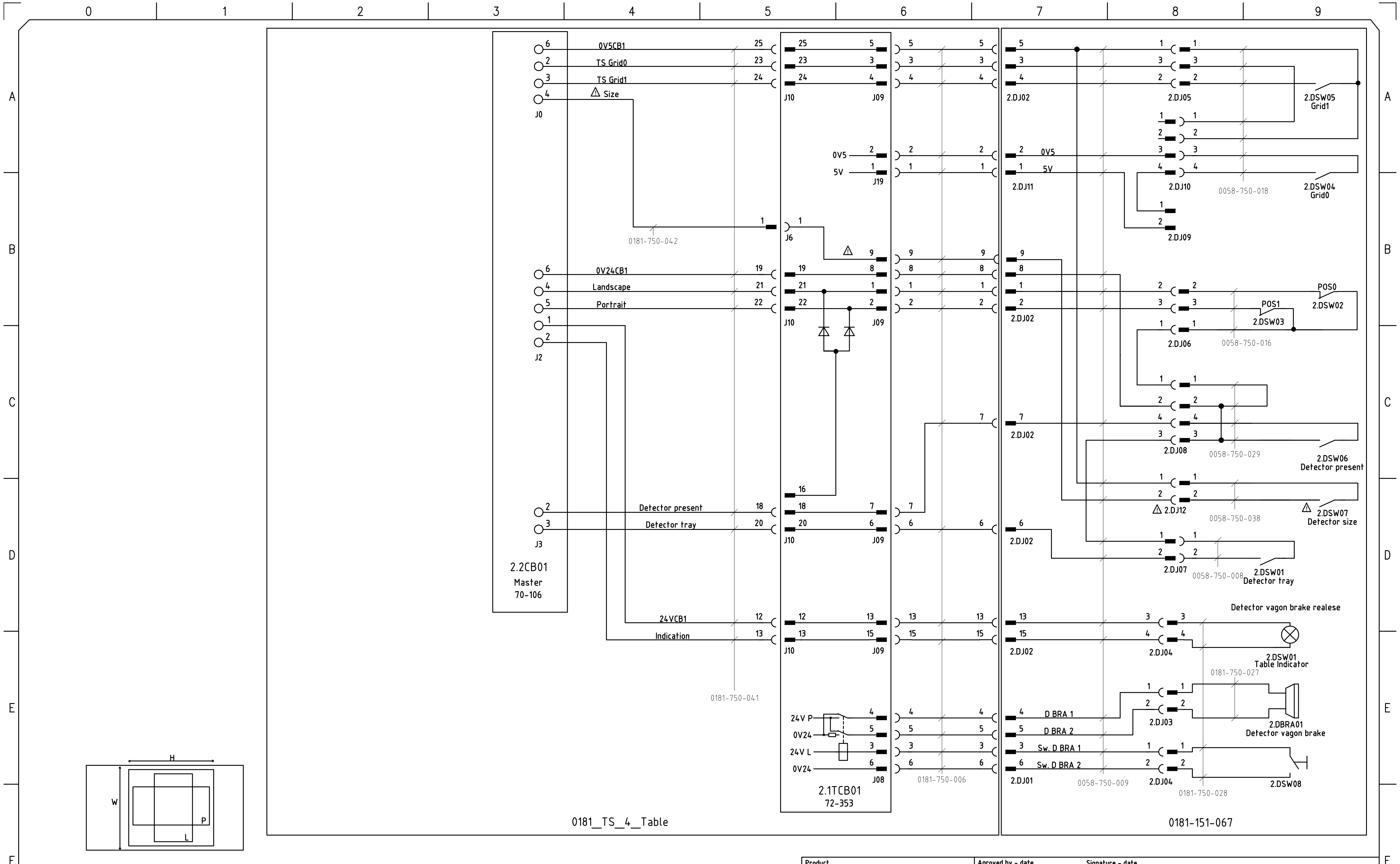
Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V



Arcoma AB	Revision notes! This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V		
Product: 0180		Aproved by - date: MAT 2018-03-05	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Signature - date: —	Sheet: 1 / 1
Description: Detector holder 14x17 Table			Drawing nr: UBD_0181_TS_4_DetH14x17	Revision: 1.1

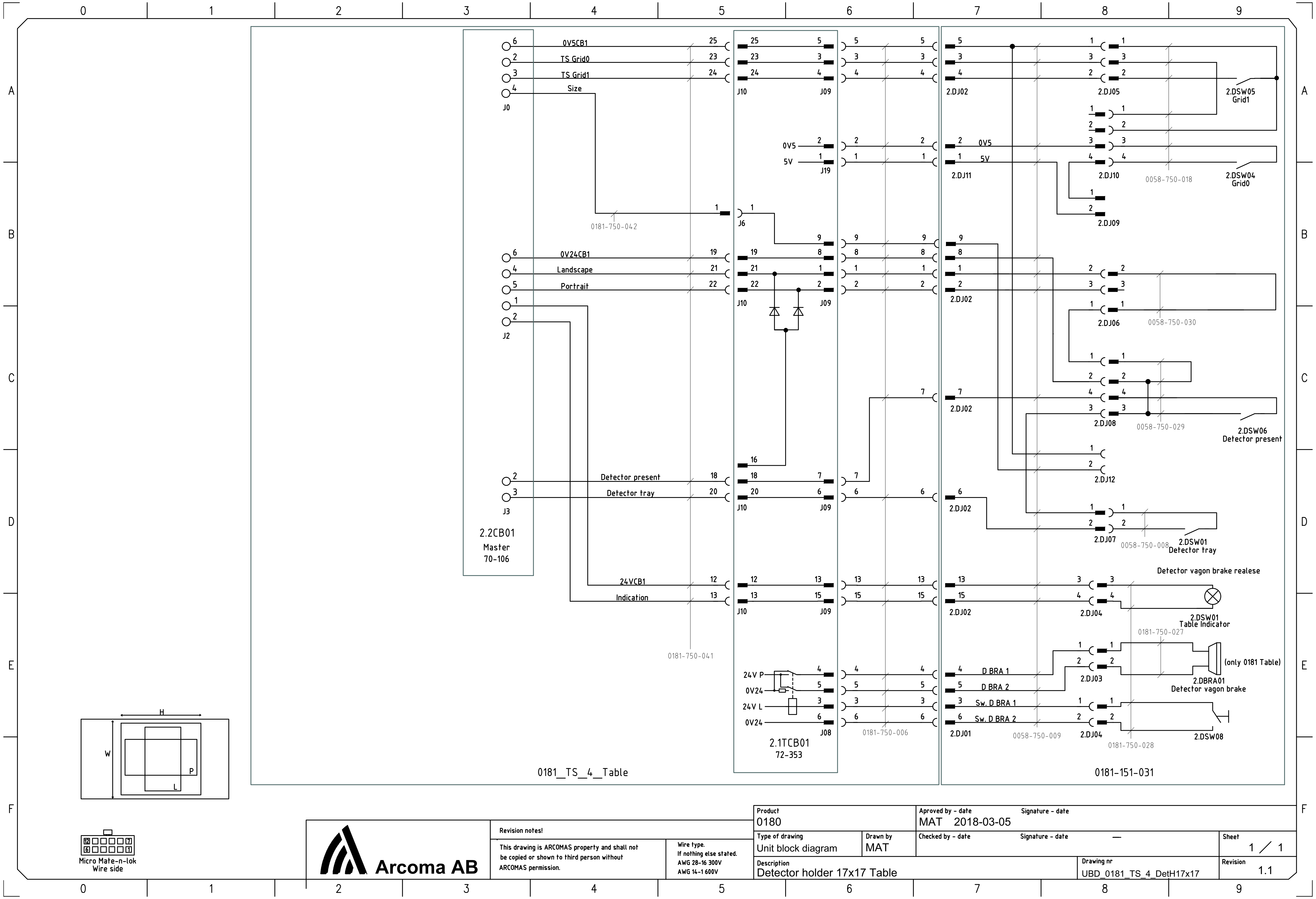


Product: 0180		Aproved by - date: MAT 2017-04-26	Signature - date
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date:	Signature - date: —	Sheet: 1 / 1
Description: Detector holder 14x17 or 17x17 Table		Drawing nr: UBD_0181_TS_4_DetH14x17x17	Revision: 1.1

Arcoma AB

Revision notes! ÄB0170420_01

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V



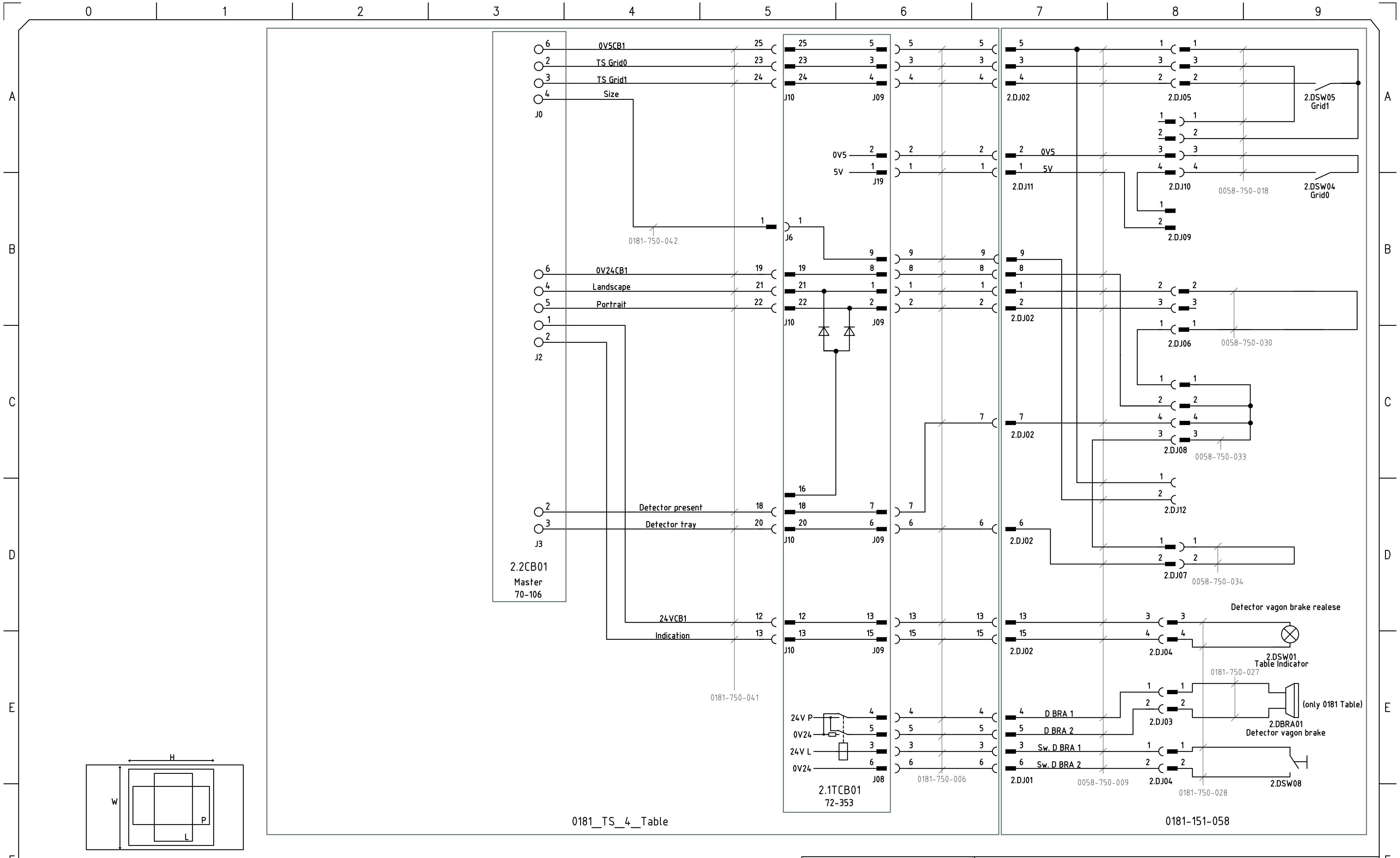
Product	Aproved by - date	Signature - date		
0180	MAT 2018-03-05			
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 1
Description: Detector holder 17x17 Table			Drawing nr: UBD_0181_TS_4_DetH17x17	Revision: 1.1

Arcoma AB

Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V



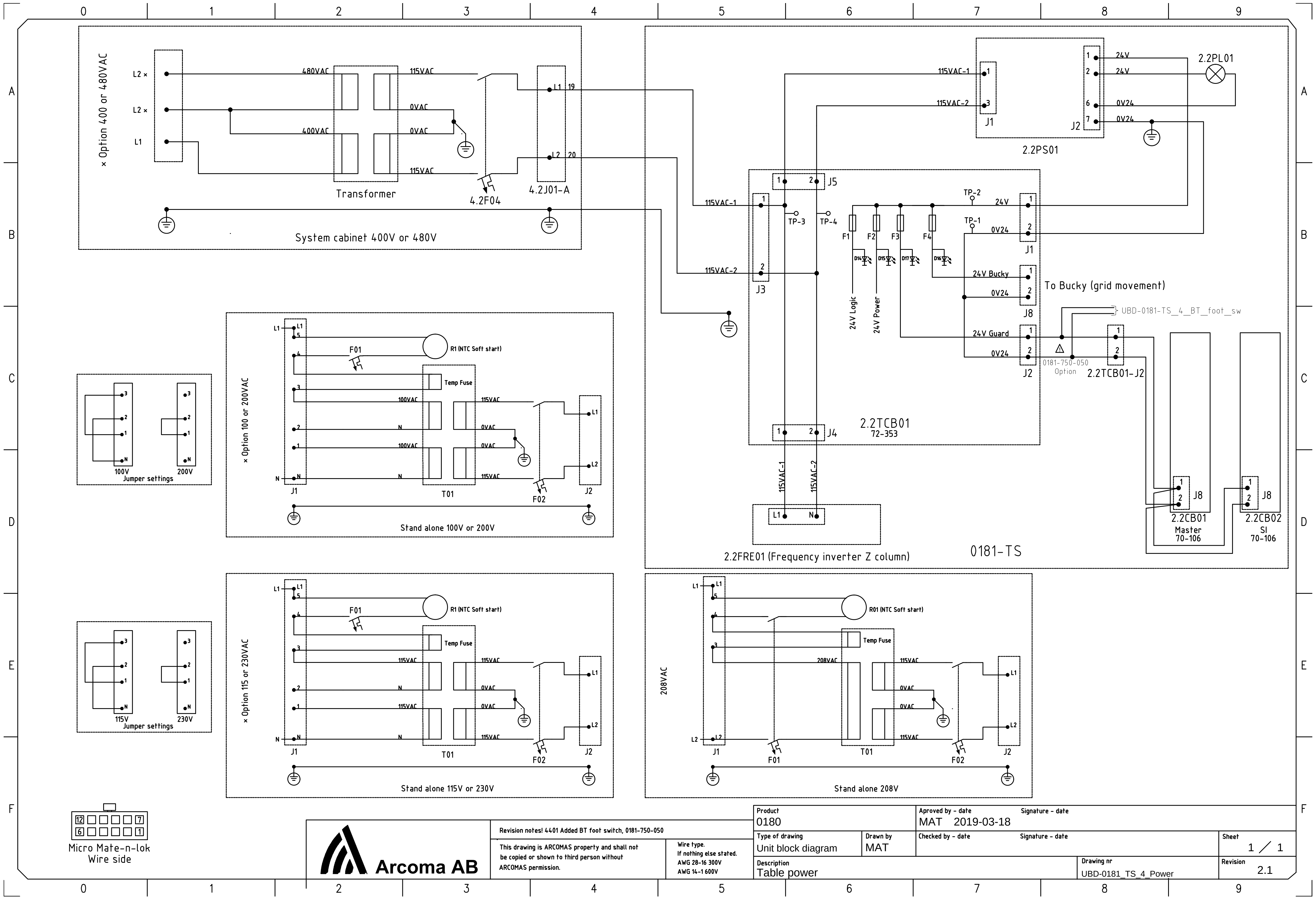
Product	Aproved by - date	Signature - date		
0180	MAT 2018-03-05			
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Signature - date —	Sheet: 1 / 1
Description: Detector holder 17x17_fixed Table			Drawing nr: UBD_0181_TS_4_DetH17x17_Fixed	Revision: 1.1

Arcoma AB

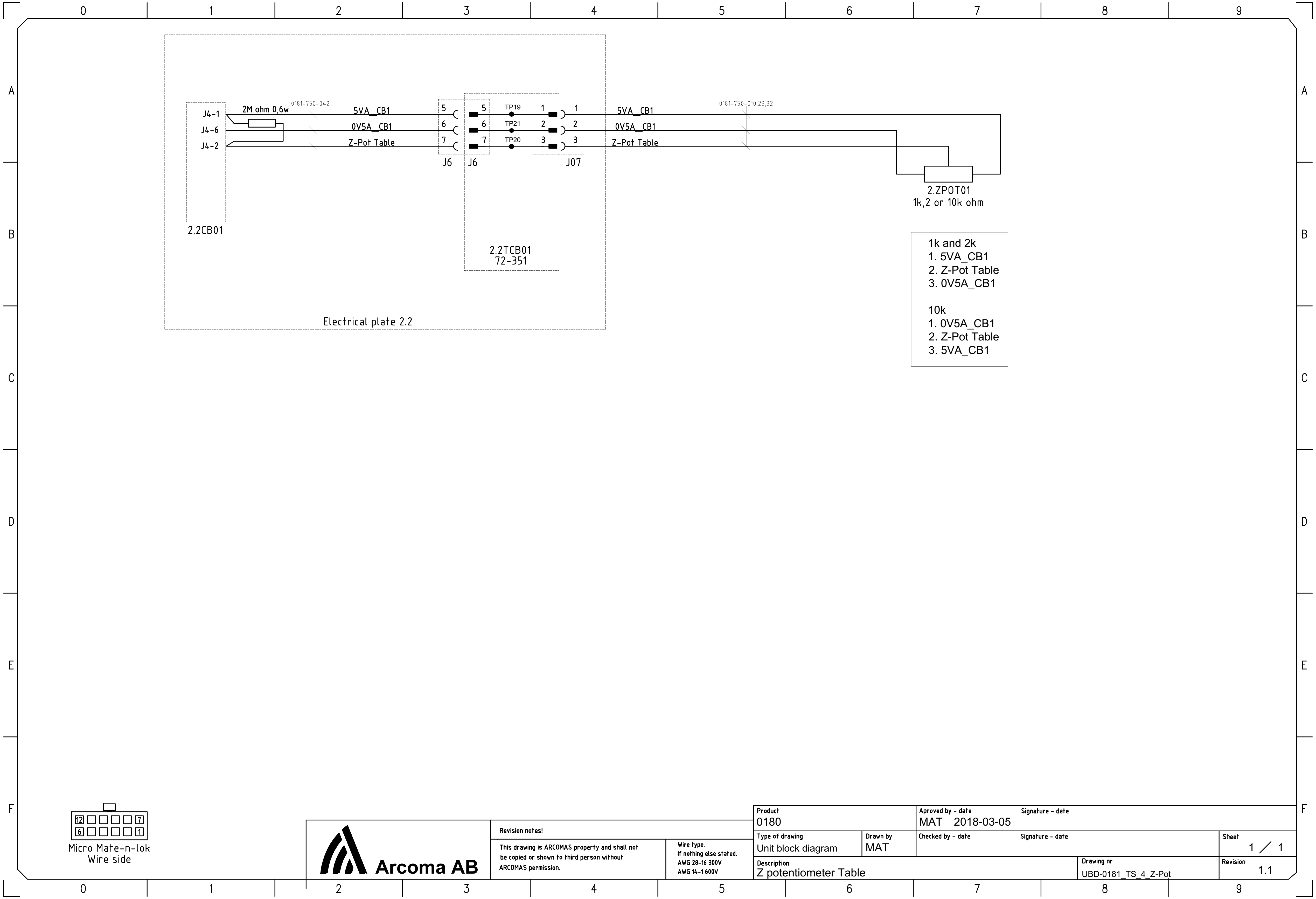
Revision notes!

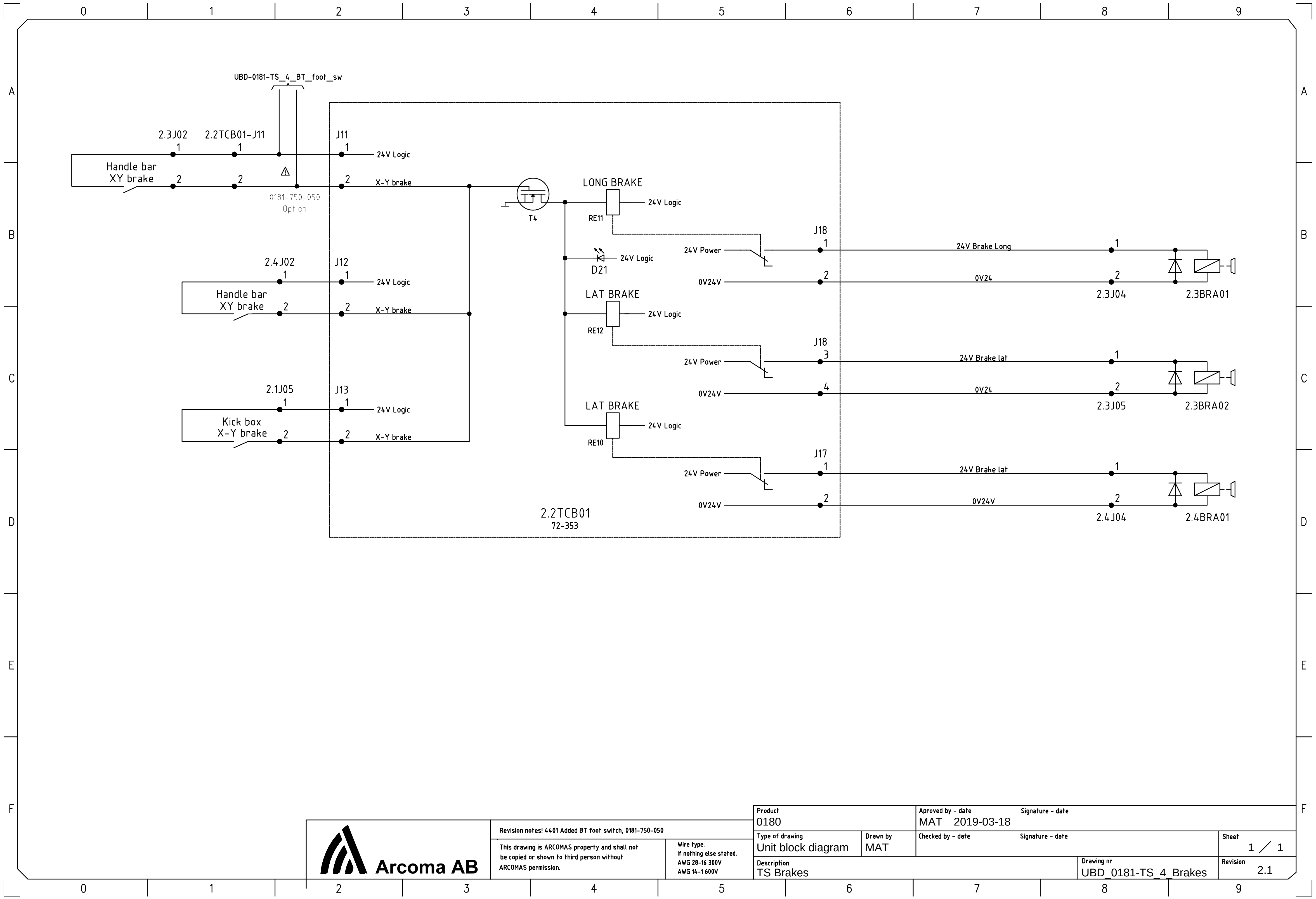
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

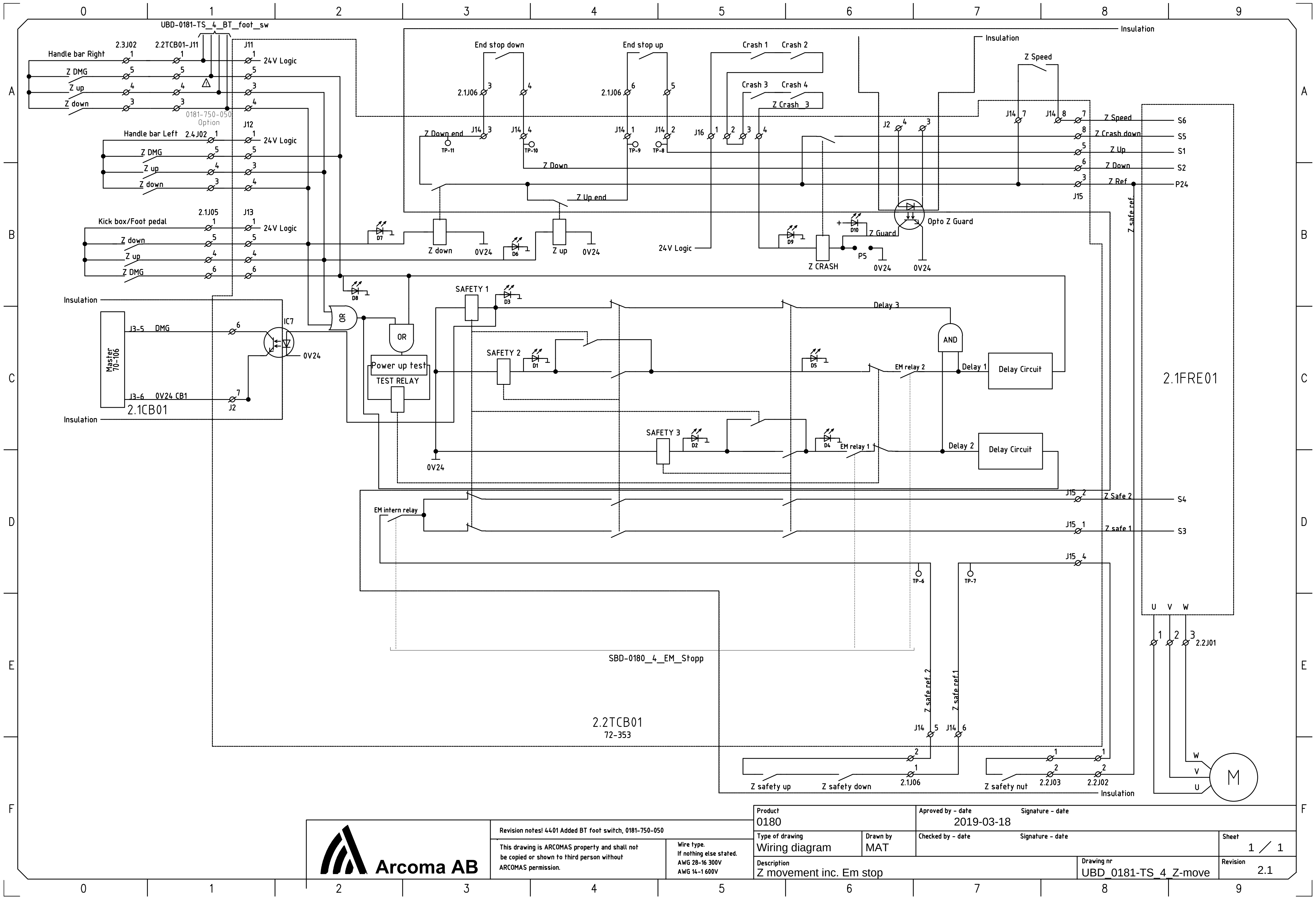


System cabinet 400V or 480V
Transformer
4.2F04
4.2J01-A
2.2PS01
2.2PL01
2.2TCB01
72-353
To Bucky (grid movement)
UBD-0181-TS_4_BT_foot_sw
0181-750-050
Option
2.2TCB01-J2
2.2CB01
Master
70-106
2.2CB02
Sl
70-106
2.2FRE01 (Frequency inverter Z column)
0181-TS
Jumper settings
Stand alone 100V or 200V
Stand alone 115V or 230V
Stand alone 208V
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! 4401 Added BT foot switch, 0181-750-050
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2019-03-18
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 1
Description
Table power
Drawing nr
UBD-0181_TS_4_Power
Revision
2.1


J4-1
J4-6
J4-2
2M ohm 0,6w
0181-750-042
5VA_CB1
0V5A_CB1
Z-Pot Table
2.2CB01
J6
J6
TP19
TP21
TP20
J07
2.2TCB01
72-351
Electrical plate 2.2
0181-750-010,23,32
2.ZPOT01
1k,2 or 10k ohm
1k and 2k
1. 5VA_CB1
2. Z-Pot Table
3. 0V5A_CB1
10k
1. 0V5A_CB1
2. Z-Pot Table
3. 5VA_CB1
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2018-03-05
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Z potentiometer Table
Drawing nr
UBD-0181_TS_4_Z-Pot
Revision
1.1

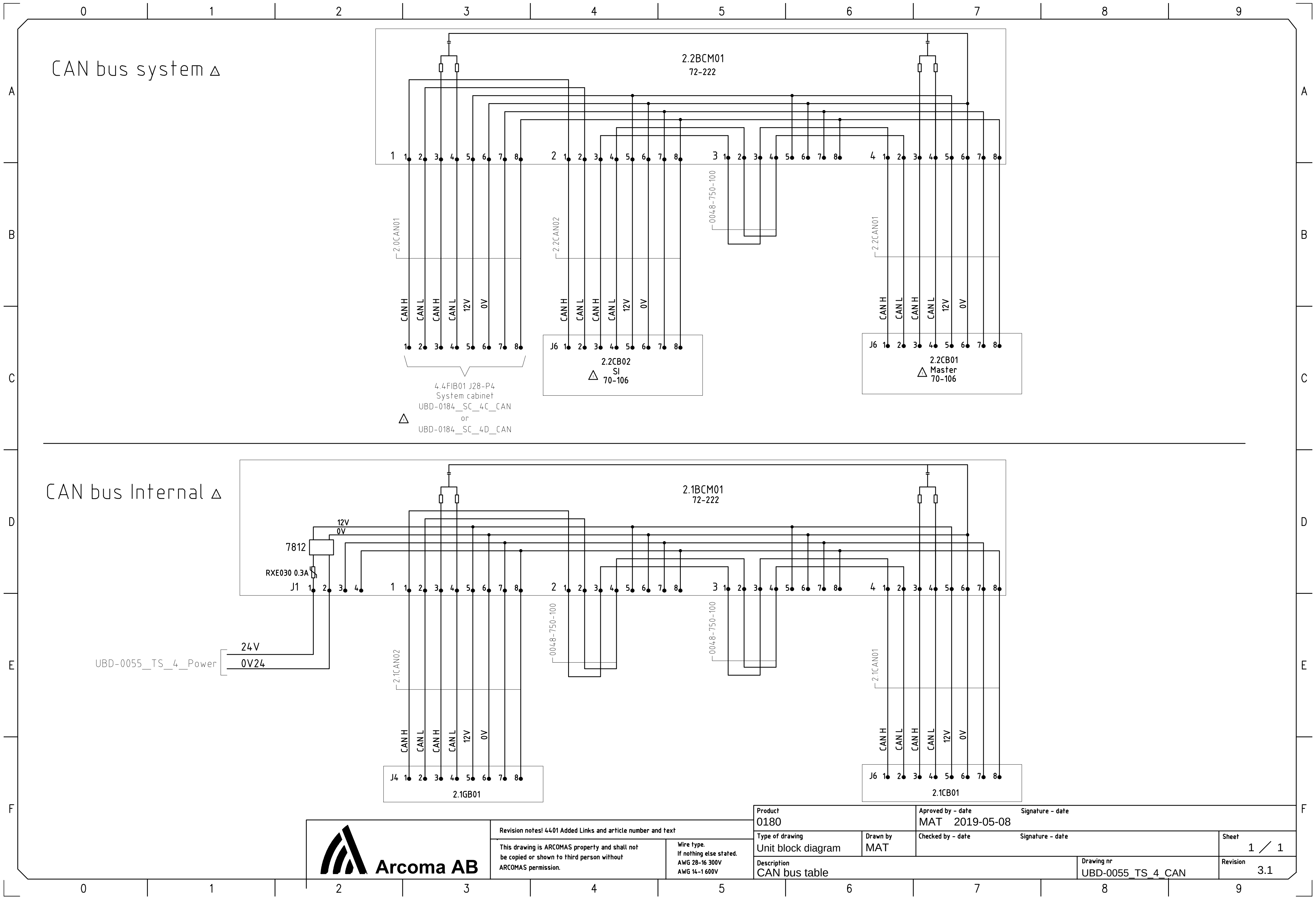


UBD-0181-TS_4_BT_foot_sw
2.3J02
2.2TCB01-J11
J11
Handle bar
XY brake
24V Logic
X-Y brake
0181-750-050
Option
T4
LONG BRAKE
RE11
24V Logic
24V Power
0V24V
J18
24V Brake Long
0V24
2.3J04
2.3BRA01
D21
2.4J02
J12
Handle bar
XY brake
LAT BRAKE
RE12
24V Brake lat
2.3J05
2.3BRA02
2.1J05
J13
Kick box
X-Y brake
LAT BRAKE
RE10
J17
2.4J04
2.4BRA01
2.2TCB01
72-353
Arcoma AB
Revision notes! 4401 Added BT foot switch, 0181-750-050
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2019-03-18
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
TS Brakes
Drawing nr
UBD_0181-TS_4_Brakes
Revision
2.1



Revision notes! 4401 Added BT foot switch, 0181-750-050	Product: 0180	Aproved by - date: 2019-03-18	Signature - date
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Type of drawing: Wiring diagram	Drawn by: MAT	Checked by - date / Signature - date / Sheet: 1 / 1
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Description: Z movement inc. Em stop	Drawing nr: UBD_0181-TS_4_Z-move	Revision: 2.1

Arcoma AB



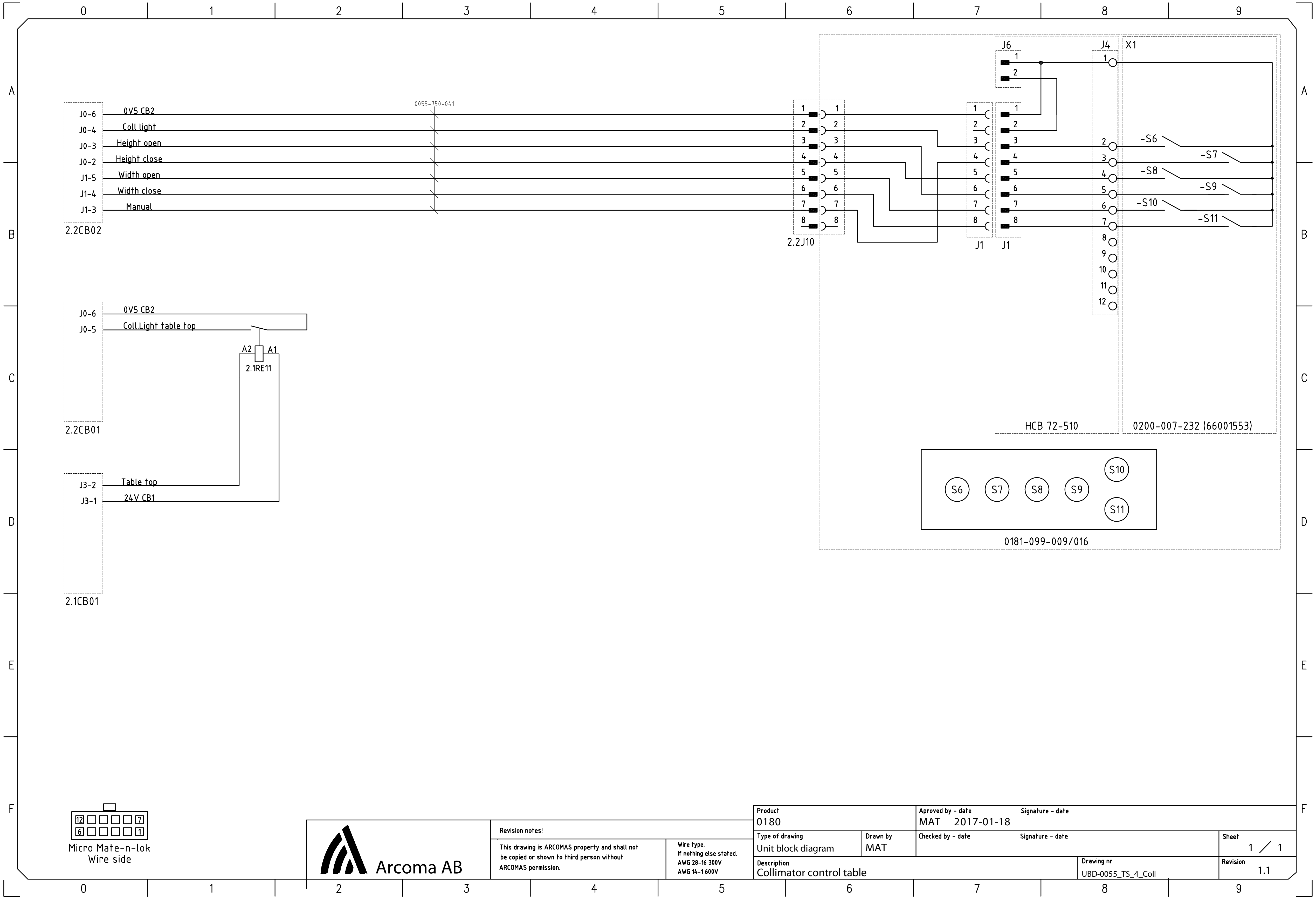
Product: 0180	Aproved by - date: MAT 2019-05-08	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Sheet: 1 / 1
Description: CAN bus table		Drawing nr: UBD-0055_TS_4_CAN	Revision: 3.1

Arcoma AB

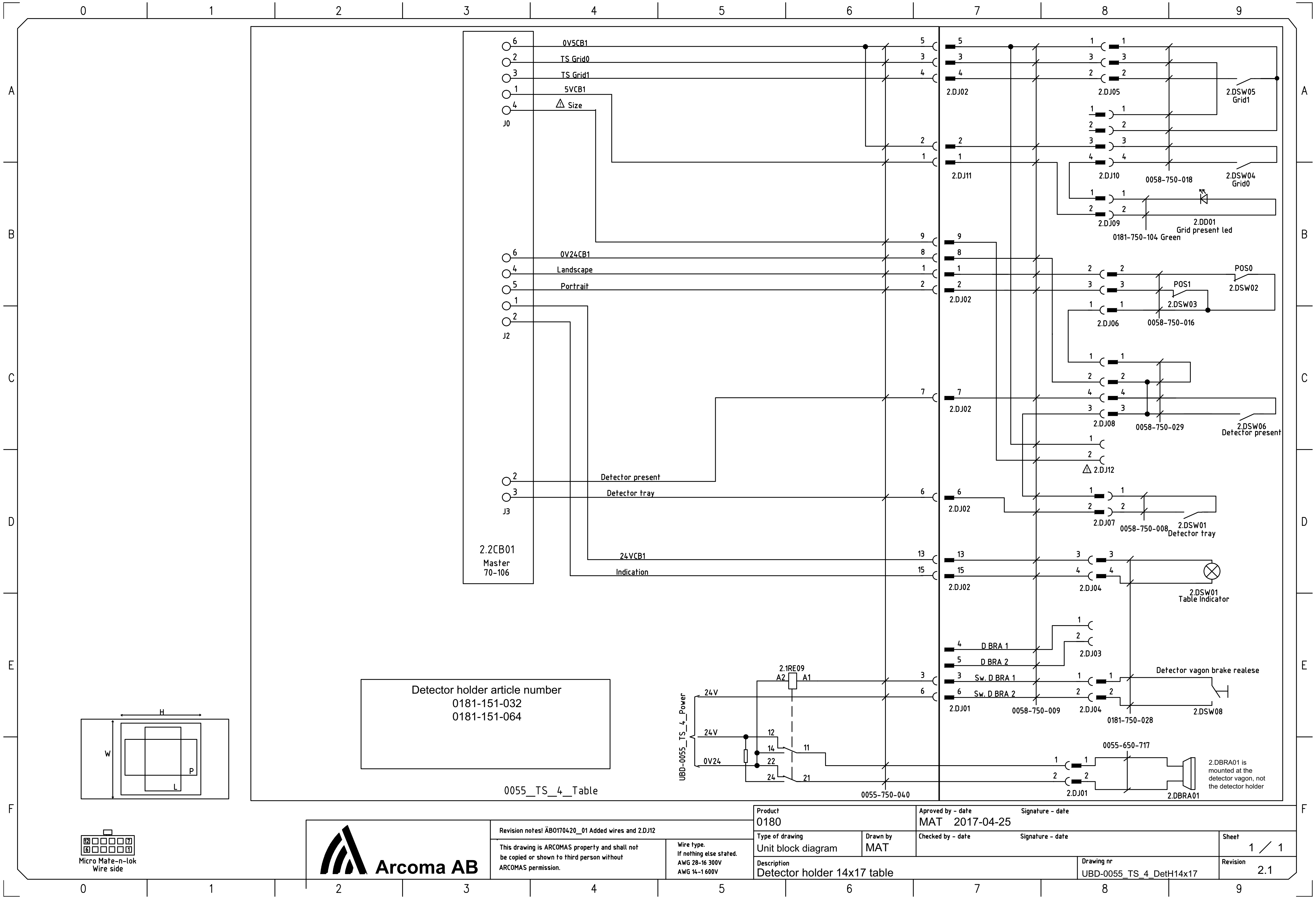
Revision notes! 4401 Added Links and article number and text

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V



J0-6 0V5 CB2
J0-4 Coll light
J0-3 Height open
J0-2 Height close
J1-5 Width open
J1-4 Width close
J1-3 Manual
2.2CB02
0055-750-041
2.2J10
J1
J6
J4
X1
-S6
-S7
-S8
-S9
-S10
-S11
J0-6 0V5 CB2
J0-5 Coll.Light table top
A2 A1
2.1RE11
2.2CB01
J3-2 Table top
J3-1 24V CB1
2.1CB01
HCB 72-510
0200-007-232 (66001553)
S6 S7 S8 S9 S10 S11
0181-099-009/016
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2017-01-18
Signature - date
Type of drawing Unit block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description Collimator control table
Drawing nr UBD-0055_TS_4_Coll
Revision 1.1

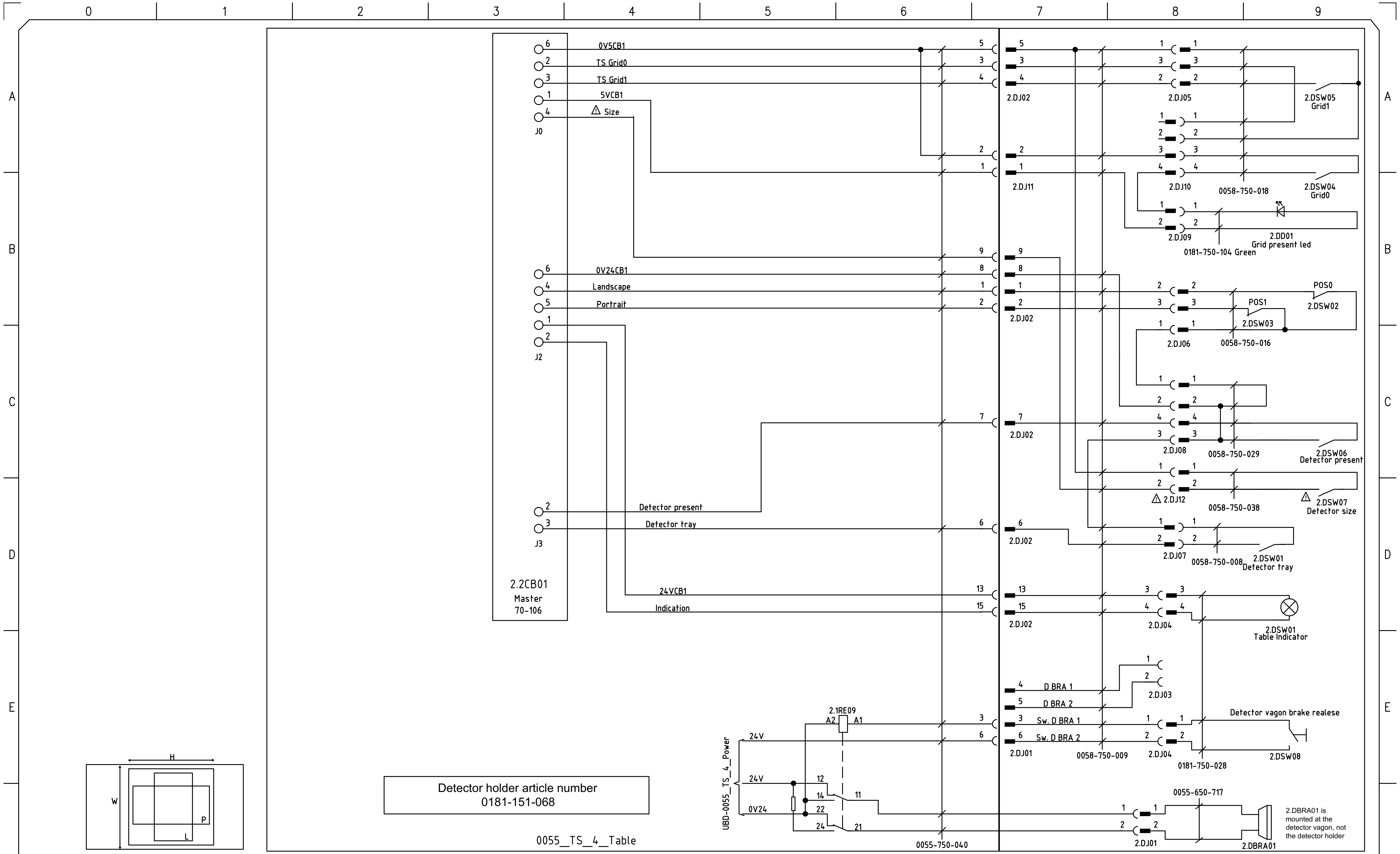


Product	0180	Aproved by - date	MAT 2017-04-25
Type of drawing	Unit block diagram	Drawn by	MAT
Description	Detector holder 14x17 table	Drawing nr	UBD-0055_TS_4_DetH14x17
Sheet	1 / 1	Revision	2.1

Arcoma AB

Revision notes! ÄB0170420__01 Added wires and 2.DJ12

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V



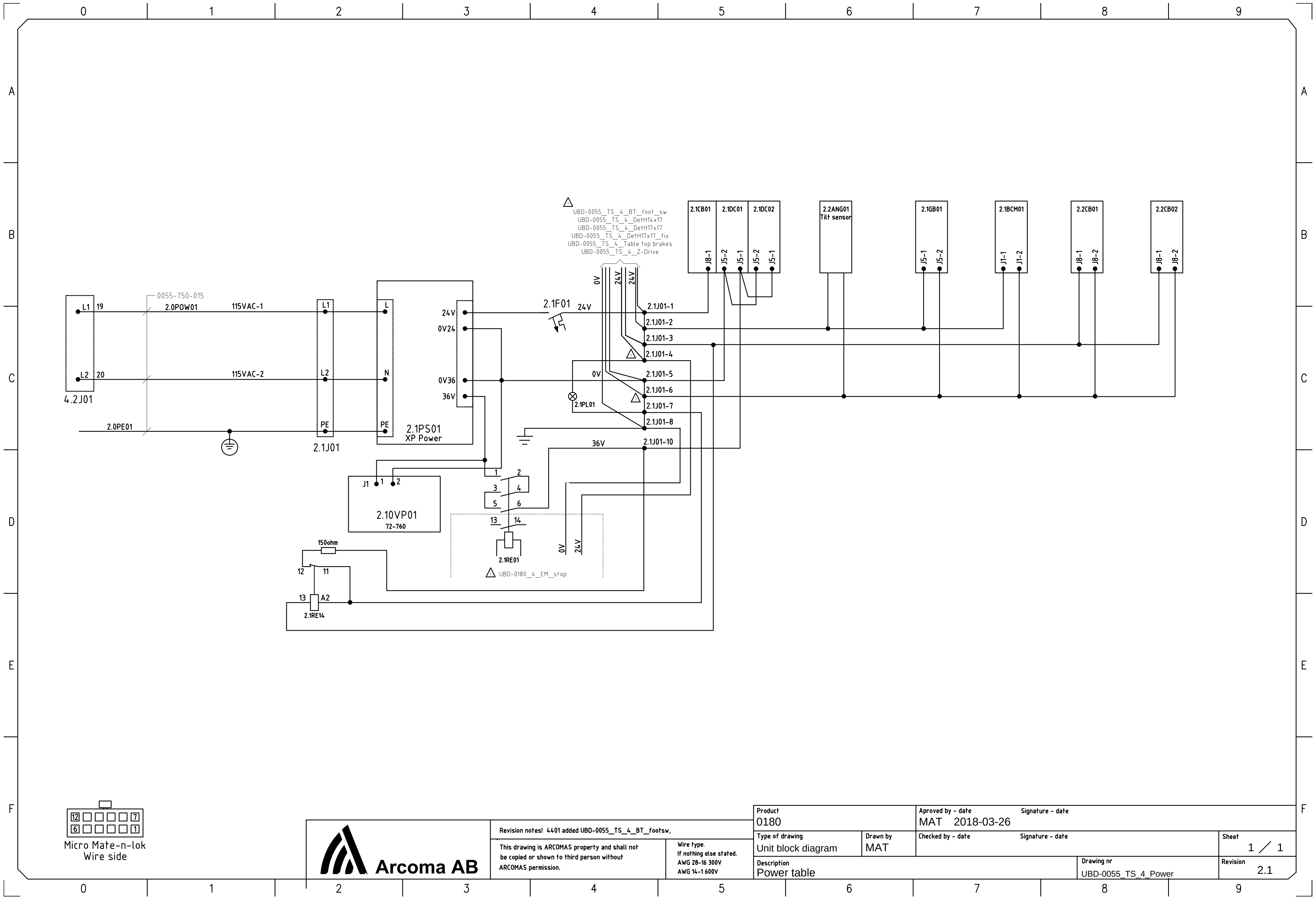
Arcoma AB

Revision notes! ÄB0170420_01 Added 2.DSW07

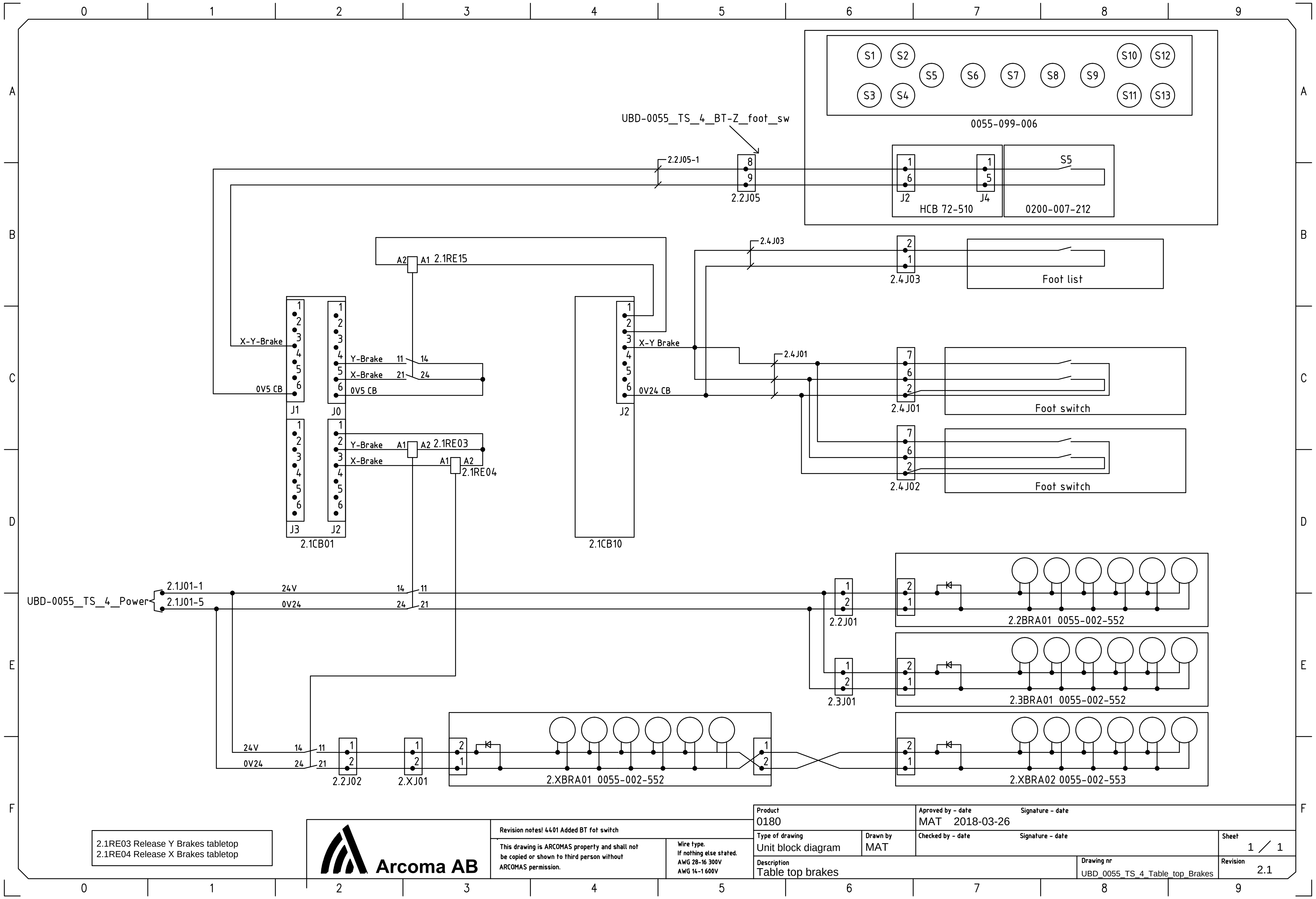
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

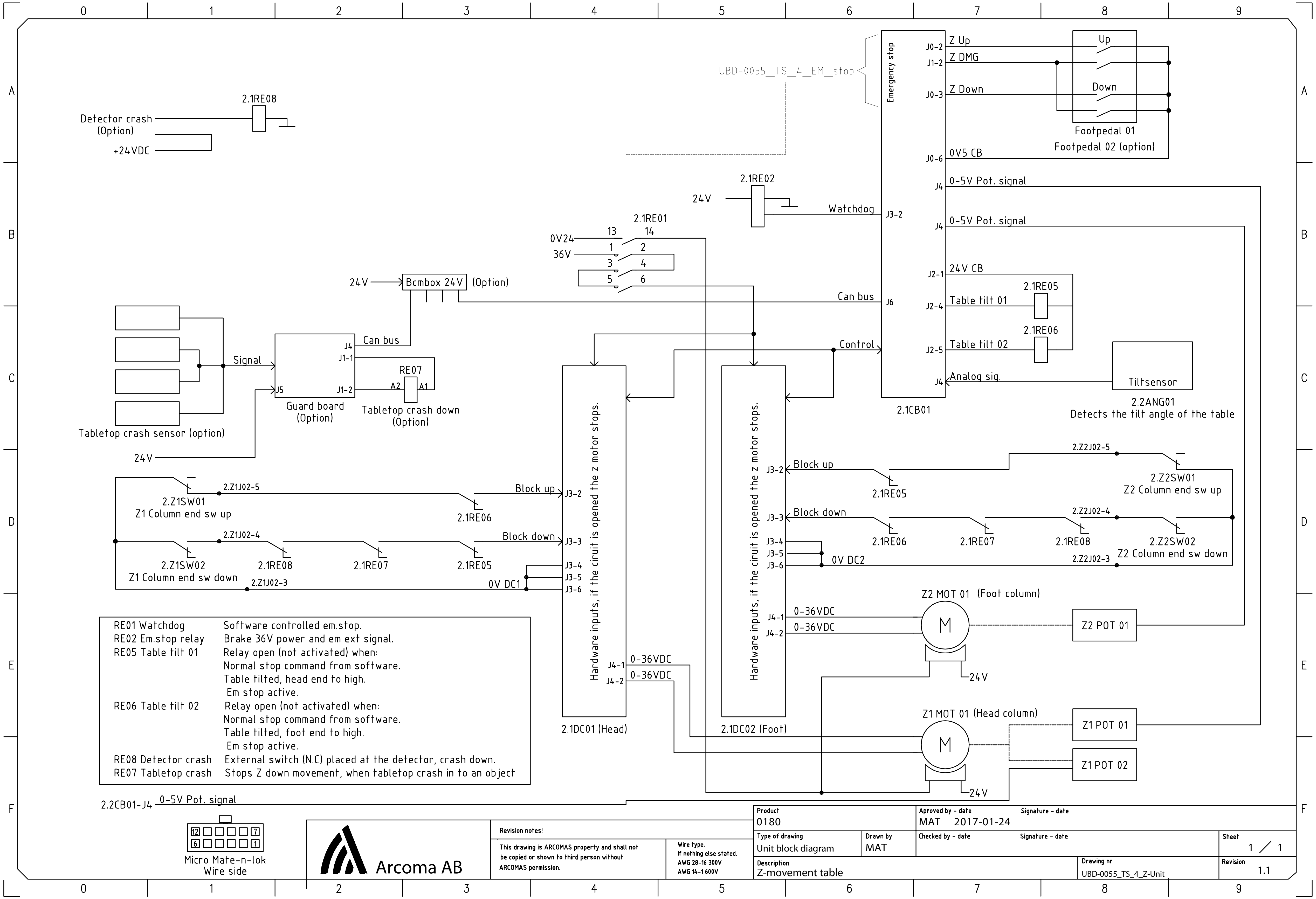
Product	Aproved by - date	Signature - date	
0180	MAT 2017-04-25		
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: Detector holder 14x17 or 17x17 table		Drawing nr: UBD-0055_TS_4_DetH14x17x17	Revision: 1.1



4.2J01
2.0POW01
115VAC-1
115VAC-2
2.0PE01
0055-750-015
2.1J01
2.1PS01
XP Power
24V
0V24
0V36
36V
2.1F01
2.1J01-1
2.1J01-2
2.1J01-3
2.1J01-4
2.1J01-5
2.1J01-6
2.1J01-7
2.1J01-8
2.1J01-10
2.1PL01
2.10VP01
72-760
2.1RE01
150ohm
2.1RE14
UBD-0180_4_EM_stop
UBD-0055_TS_4_BT_foot_sw
UBD-0055_TS_4_DetH14x17
UBD-0055_TS_4_DetH17x17
UBD-0055_TS_4_DetH17x17_fix
UBD-0055_TS_4_Table top brakes
UBD-0055_TS_4_Z-Drive
2.1CB01
2.1DC01
2.1DC02
2.2ANG01
Tilt sensor
2.1GB01
2.1BCM01
2.2CB01
2.2CB02
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! 4401 added UBD-0055_TS_4_BT_footsw,
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2018-03-26
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 1
Description
Power table
Drawing nr
UBD-0055_TS_4_Power
Revision
2.1



UBD-0055_TS_4_BT-Z_foot_sw
0055-099-006
S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13
2.2J05-1
2.2J05
HCB 72-510
0200-007-212
2.1RE15
2.4J03
Foot list
X-Y-Brake
0V5 CB
Y-Brake
X-Brake
X-Y Brake
0V24 CB
2.4J01
Foot switch
2.4J02
Foot switch
2.1RE03
2.1RE04
2.1CB01
2.1CB10
UBD-0055_TS_4_Power
2.1J01-1
2.1J01-5
24V
0V24
2.2J01
2.2BRA01 0055-002-552
2.3J01
2.3BRA01 0055-002-552
2.2J02
2.XJ01
2.XBRA01 0055-002-552
2.XBRA02 0055-002-553
2.1RE03 Release Y Brakes tabletop
2.1RE04 Release X Brakes tabletop
Arcoma AB
Revision notes! 4401 Added BT fot switch
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2018-03-26
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 1
Description
Table top brakes
Drawing nr
UBD_0055_TS_4_Table_top_Brakes
Revision
2.1



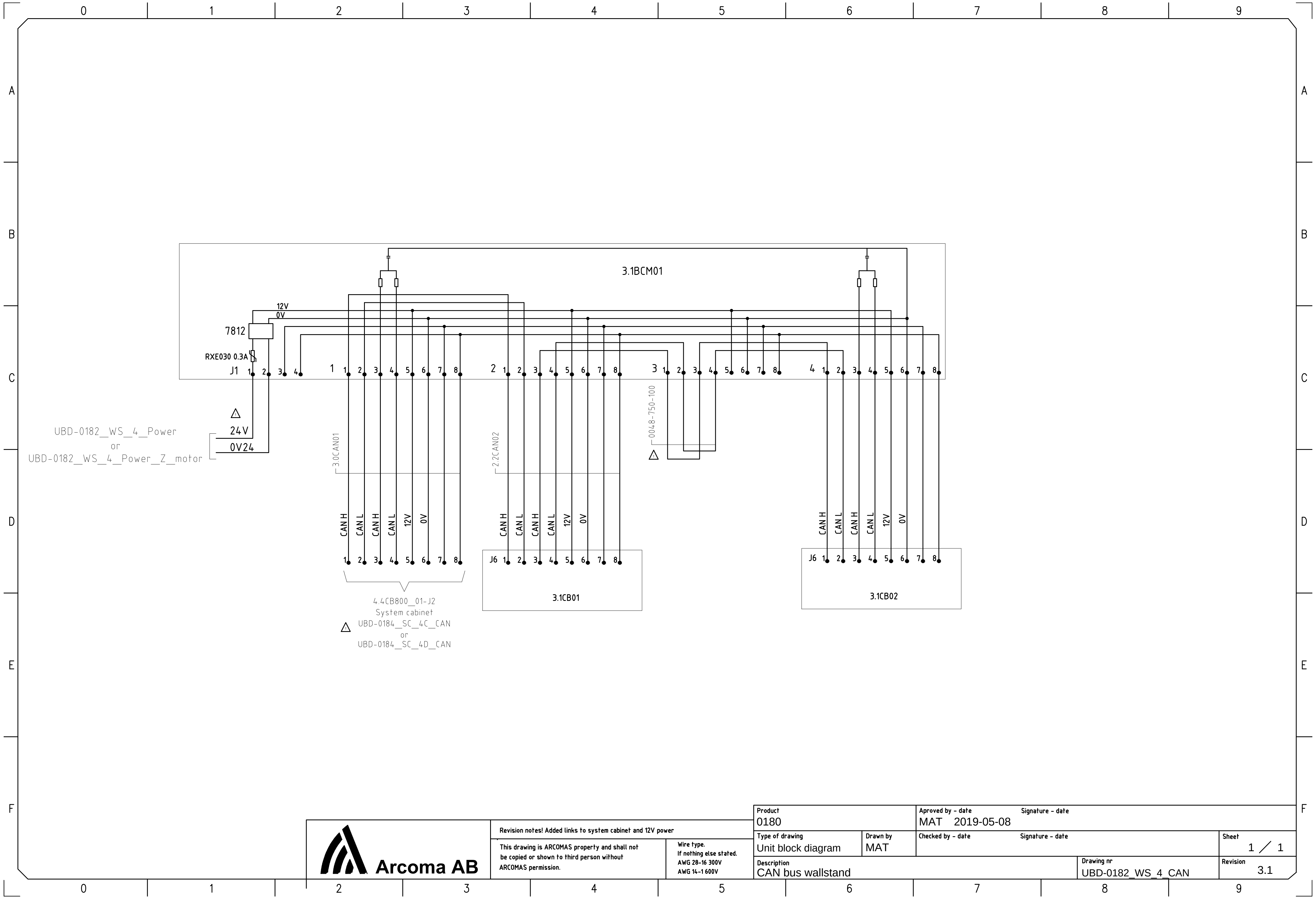
RE01 Watchdog	Software controlled em.stop.
RE02 Em.stop relay	Brake 36V power and em ext signal.
RE05 Table tilt 01	Relay open (not activated) when: Normal stop command from software. Table tilted, head end to high. Em stop active.
RE06 Table tilt 02	Relay open (not activated) when: Normal stop command from software. Table tilted, foot end to high. Em stop active.
RE08 Detector crash	External switch (N.C) placed at the detector, crash down.
RE07 Tabletop crash	Stops Z down movement, when tabletop crash in to an object

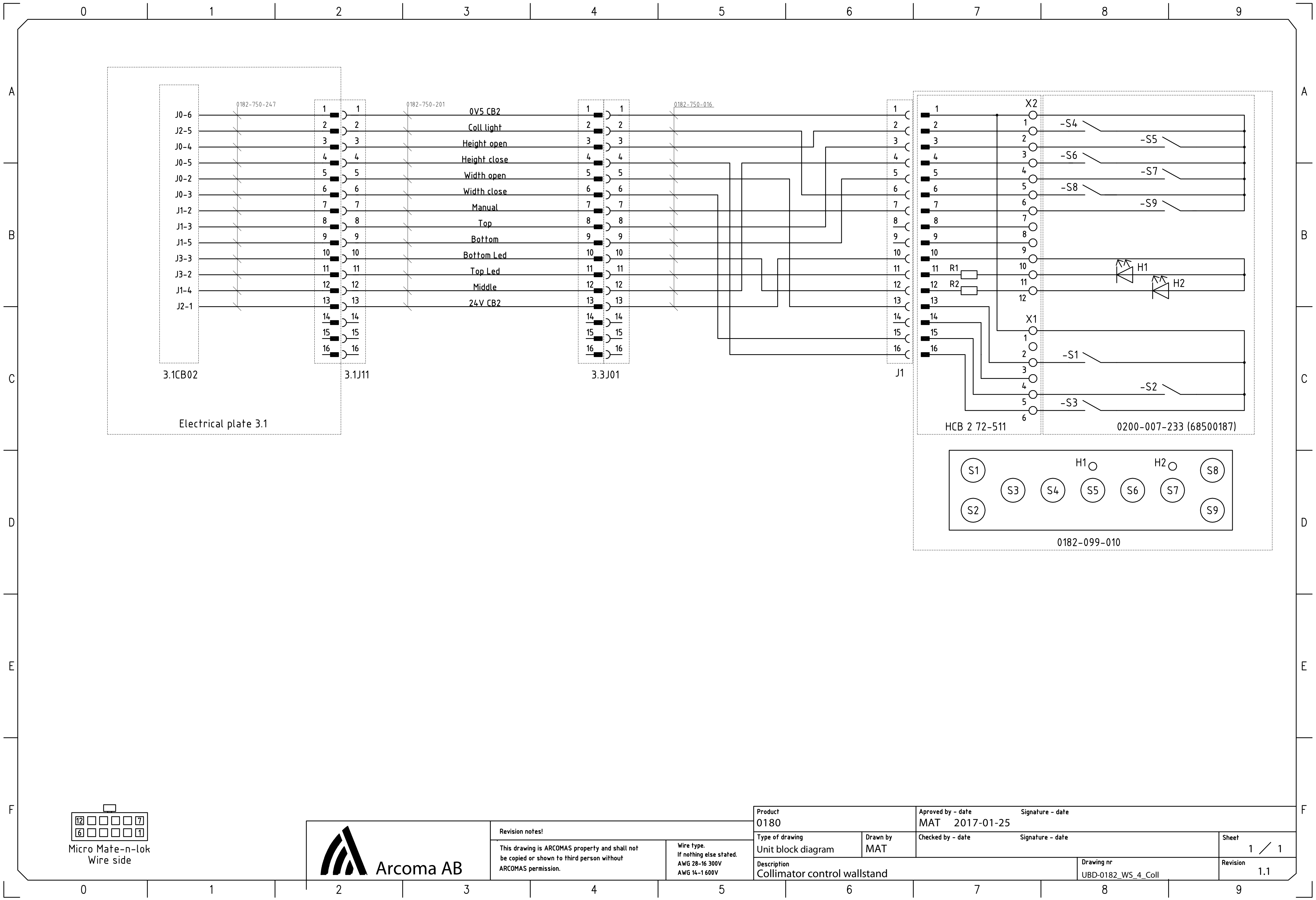
Arcoma AB

Revision notes!

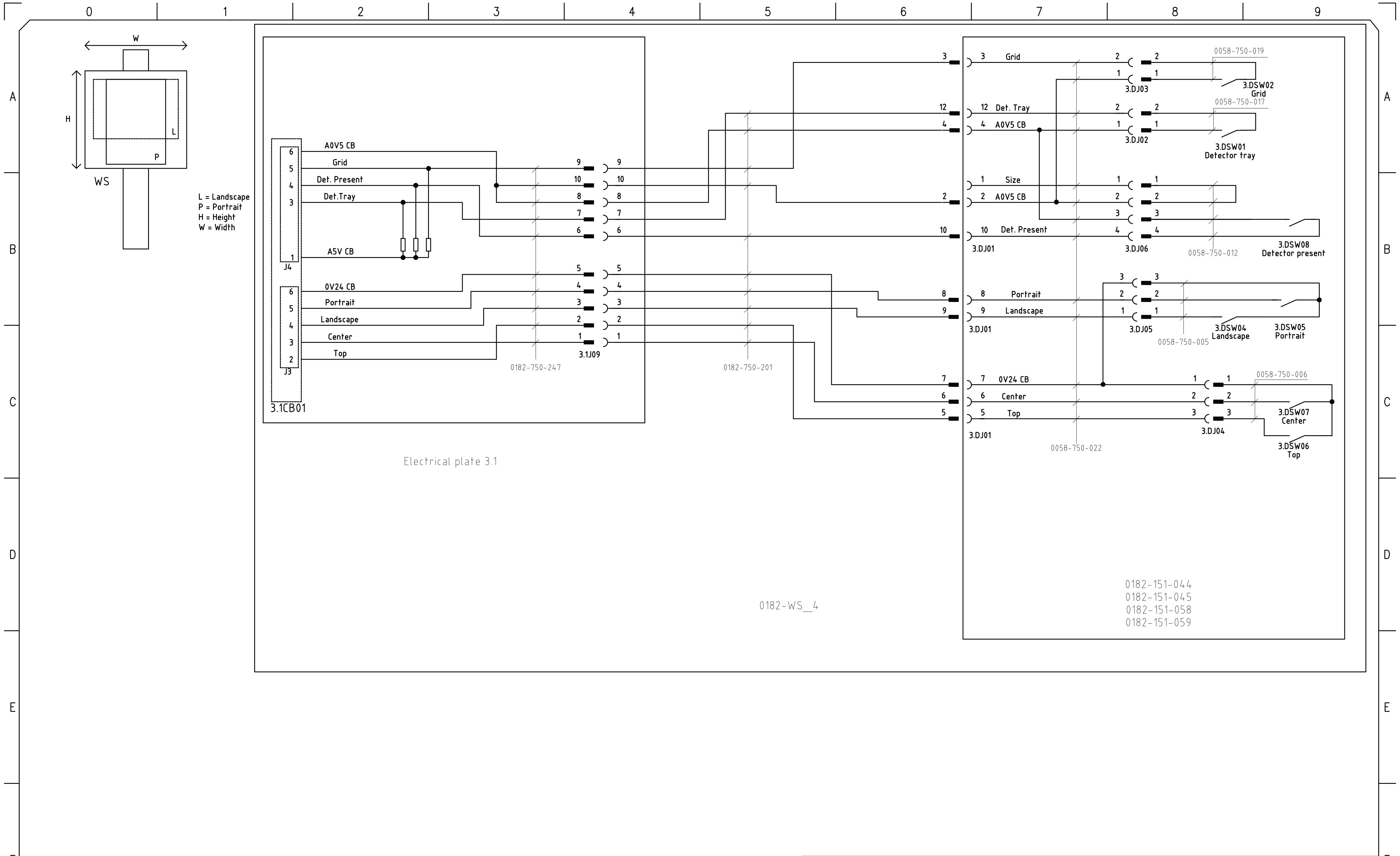
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product: 0180	Aproved by - date: MAT 2017-01-24	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Signature - date
Sheet: 1 / 1			
Description: Z-movement table	Drawing nr: UBD-0055_TS_4_Z-Unit	Revision: 1.1	


3.1BCM01
12V
0V
7812
RXE030 0.3A
J1
UBD-0182__WS__4__Power
or
UBD-0182__WS__4__Power__Z__motor
24V
0V24
3.0CAN01
2.2CAN02
0048-750-100
CAN H
CAN L
CAN H
CAN L
12V
0V
J6
3.1CB01
3.1CB02
4.4CB800__01-J2
System cabinet
UBD-0184__SC__4C__CAN
or
UBD-0184__SC__4D__CAN
Arcoma AB
Revision notes! Added links to system cabinet and 12V power
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2019-05-08
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CAN bus wallstand
Drawing nr
UBD-0182_WS_4_CAN
Revision
3.1



J0-6
J2-5
J0-4
J0-5
J0-2
J0-3
J1-2
J1-3
J1-5
J3-3
J3-2
J1-4
J2-1
0182-750-247
0182-750-201
0182-750-016
0V5 CB2
Coll light
Height open
Height close
Width open
Width close
Manual
Top
Bottom
Bottom Led
Top Led
Middle
24V CB2
3.1CB02
3.1J11
3.3J01
J1
Electrical plate 3.1
X2
X1
-S1
-S2
-S3
-S4
-S5
-S6
-S7
-S8
-S9
R1
R2
H1
H2
HCB 2 72-511
0200-007-233 (68500187)
S1
S2
S3
S4
S5
S6
S7
S8
S9
0182-099-010
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-01-25
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Collimator control wallstand
Drawing nr
UBD-0182_WS_4_Coll
Revision
1.1



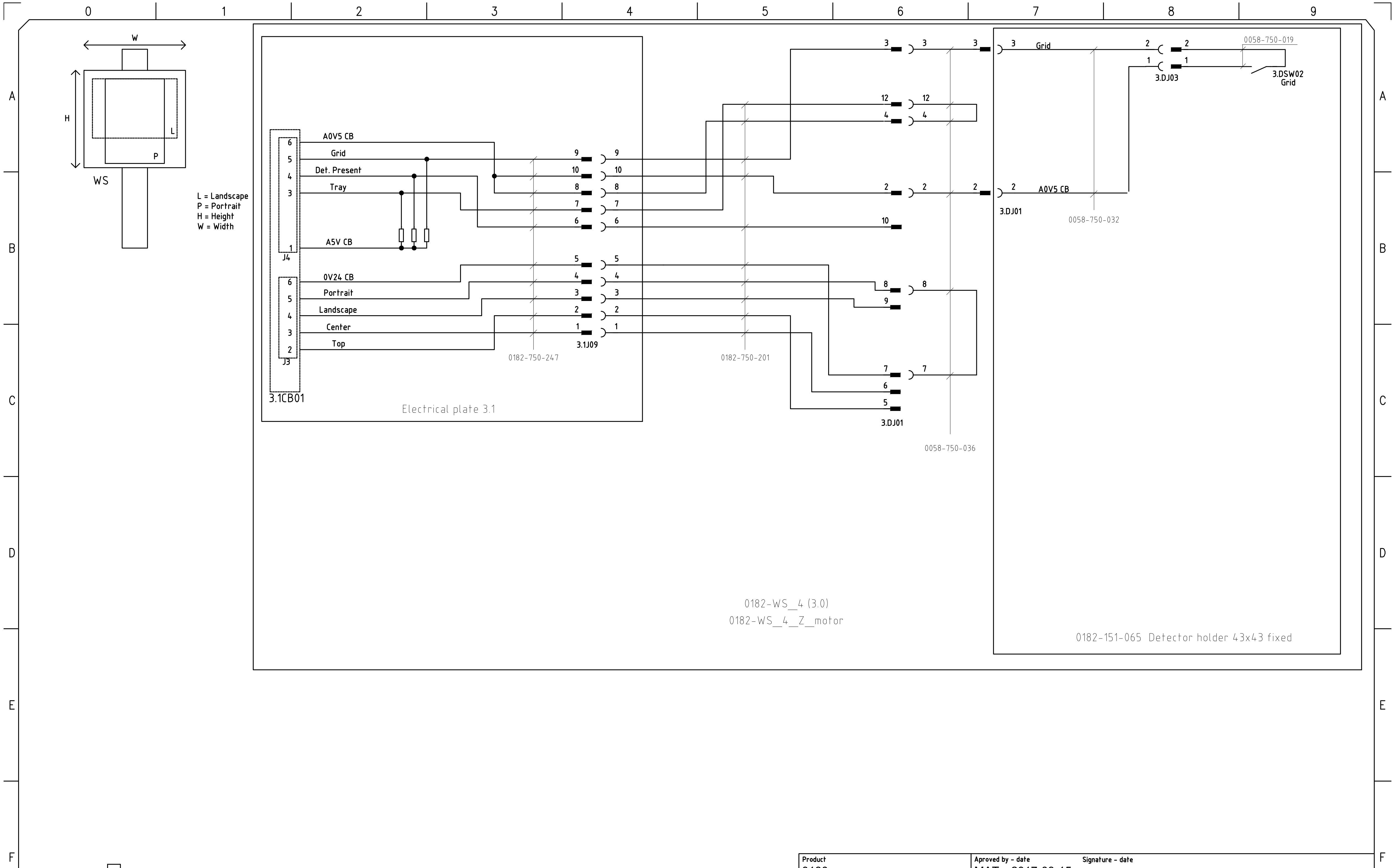
Arcoma AB

Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product	Aproved by - date	Signature - date		
0180	MAT 2017-01-25			
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 1
Description: 0182 WS 4 Detector holder 14x17, top, center, land,port			Drawing nr: UBD-0182_WS_4_Det.H14x17	Revision: 1.1



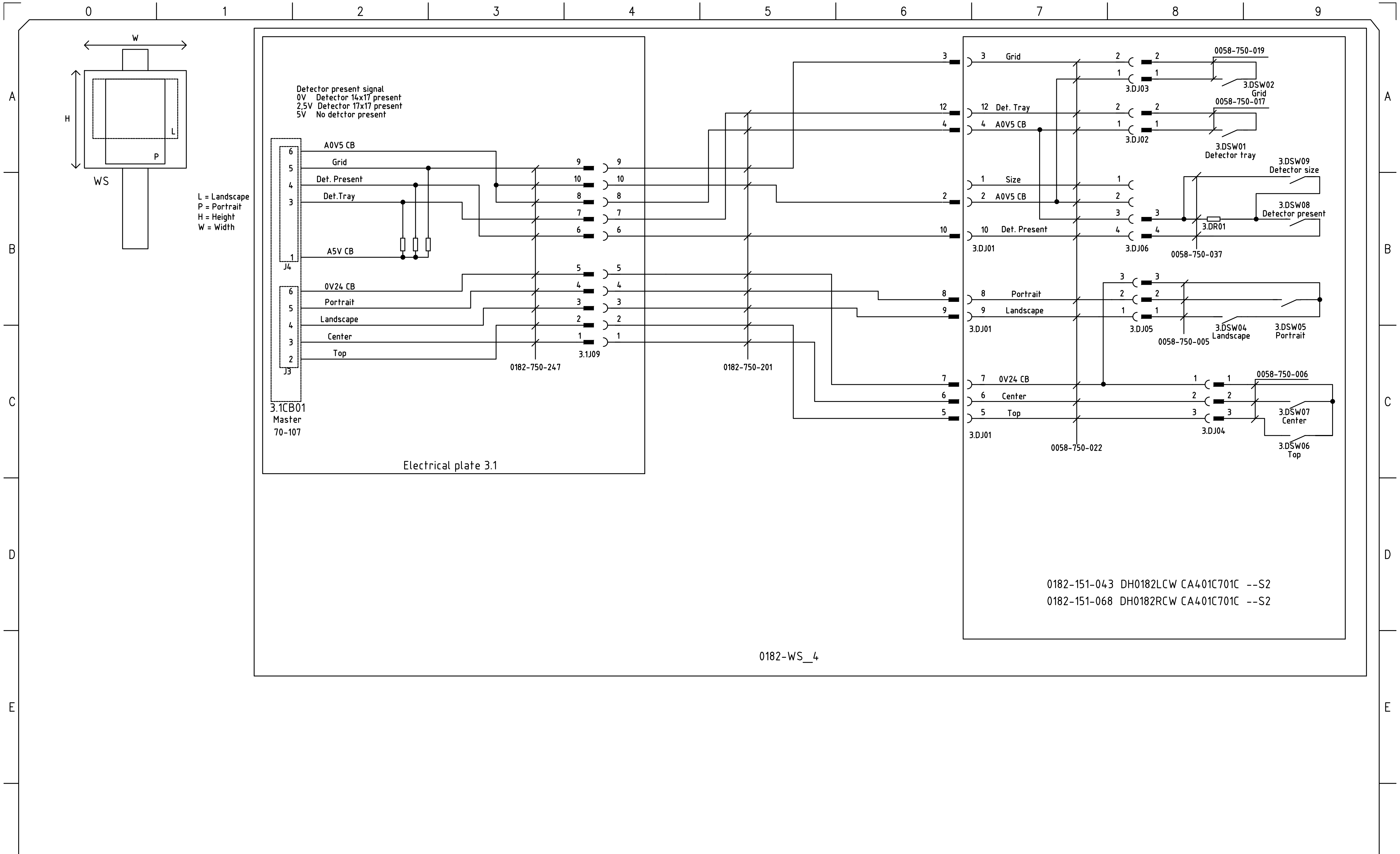
Arcoma AB

Revision notes! Added 0058-750-036

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

Product	Aproved by - date	Signature - date	
0180	MAT 2017-03-15		
Type of drawing	Drawn by	Checked by - date / Signature - date	Sheet
Unit block diagram	MAT		1 / 1
Description		Drawing nr	Revision
Detector holder 17x17_fix wallstand		UBD-0182_WS_4_Det.H17x17_fix	2.1



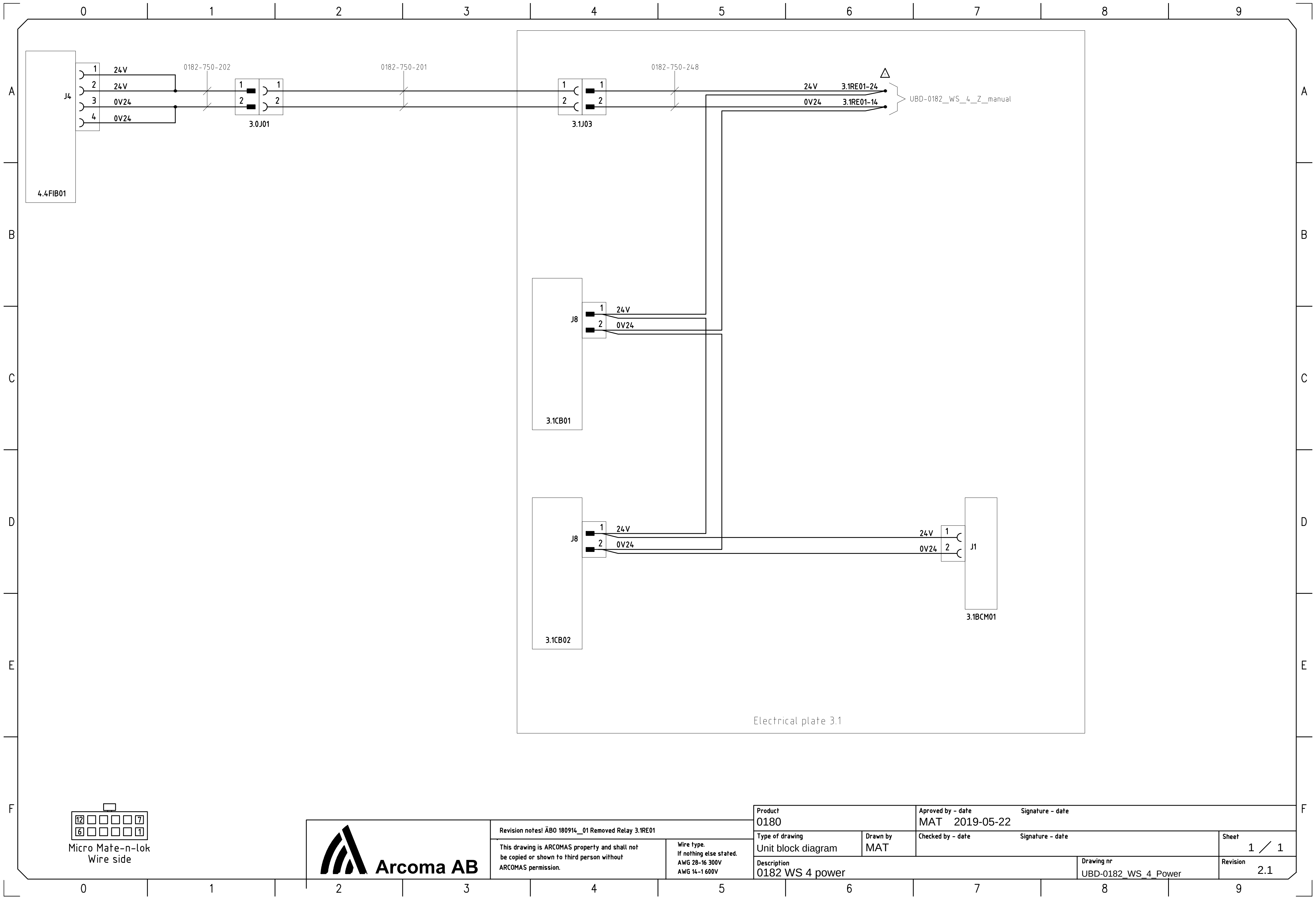
Arcoma AB

Revision notes! ÄB0170420_01

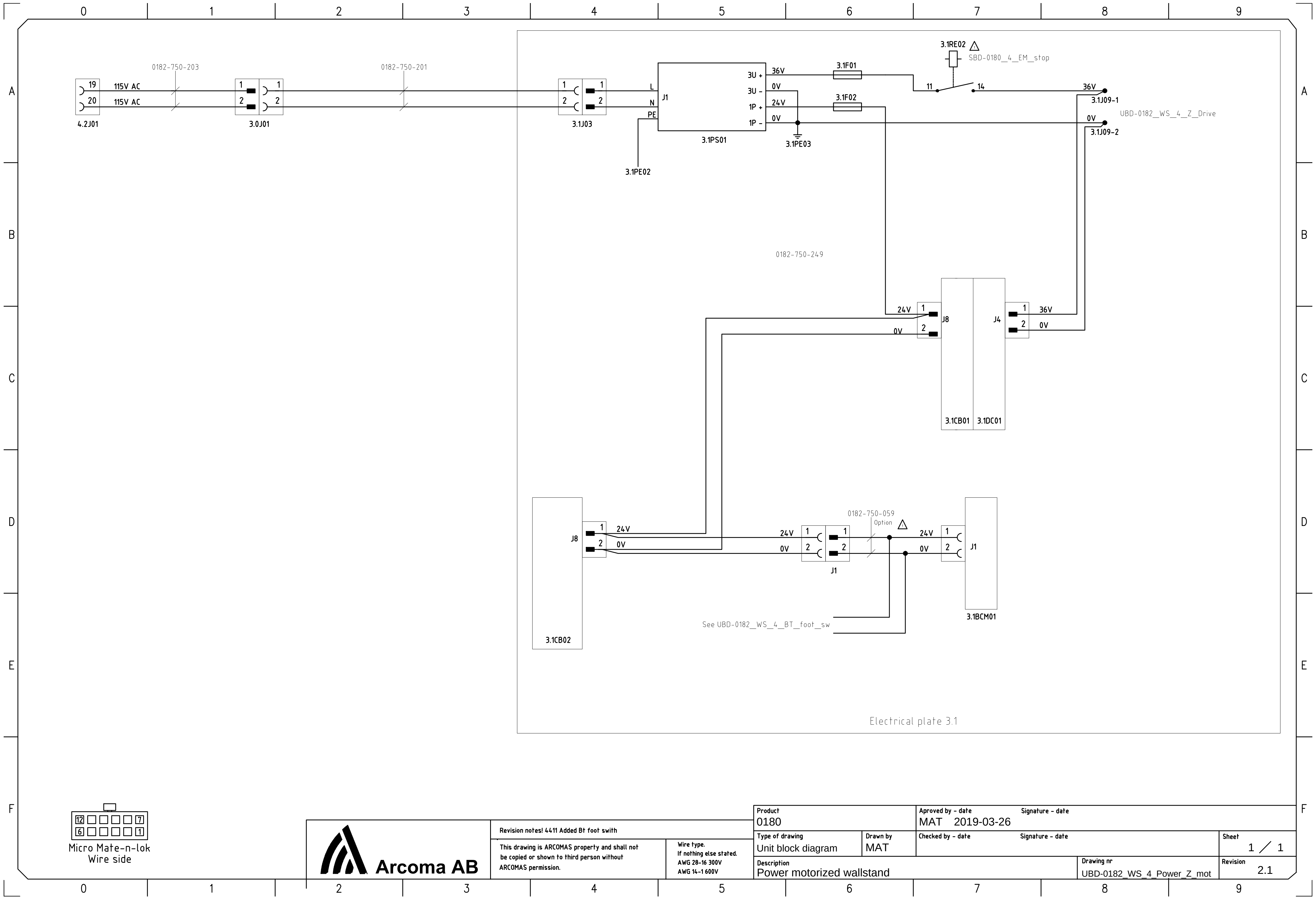
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

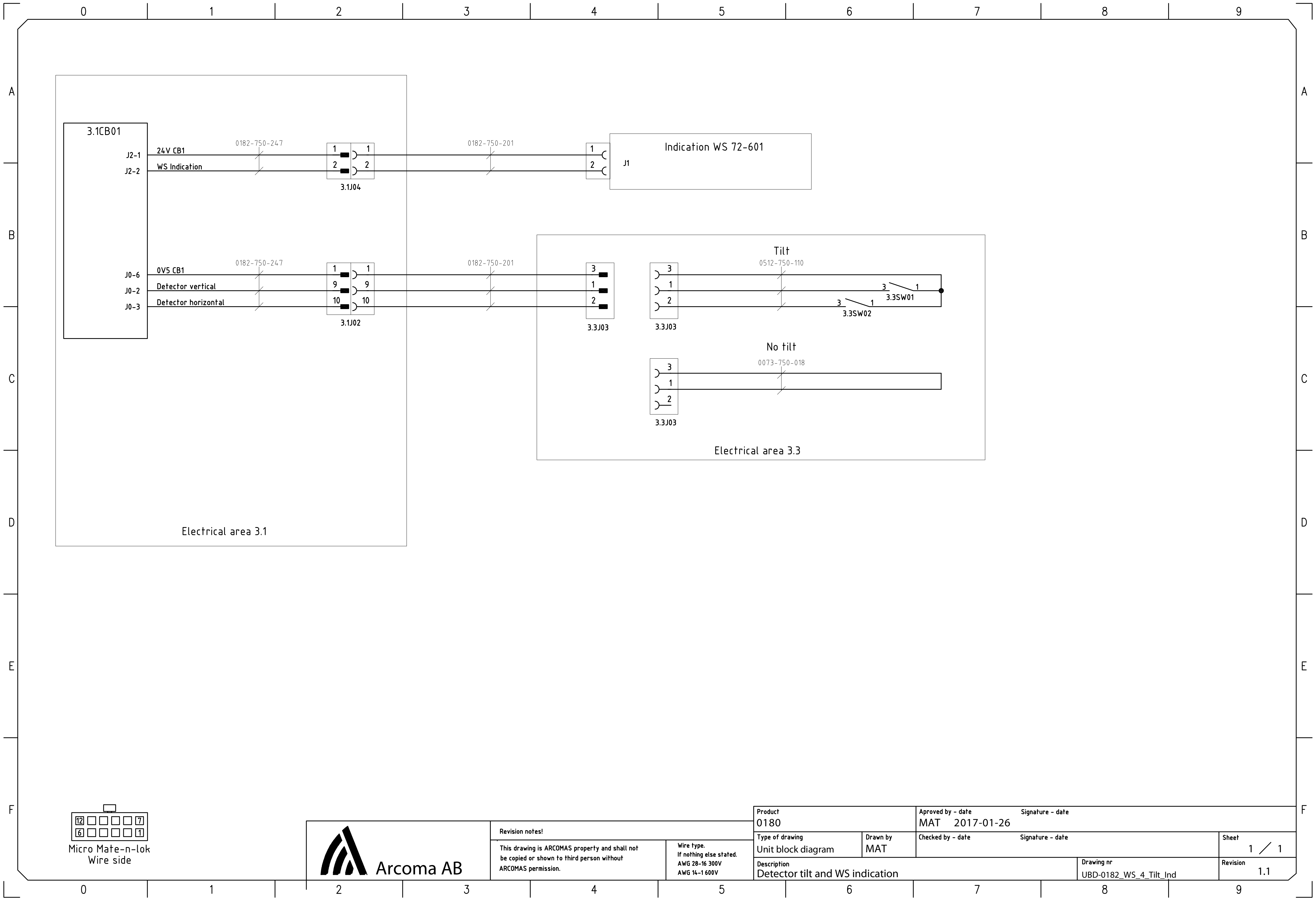
Product	Aproved by - date	Signature - date	
0180	MAT 2017-04-26		
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: Detector holder 14x17 or 17x17 wallstand		Drawing nr: UBD-0182_WS_4_Det.H14x17x17	Revision: 1.1



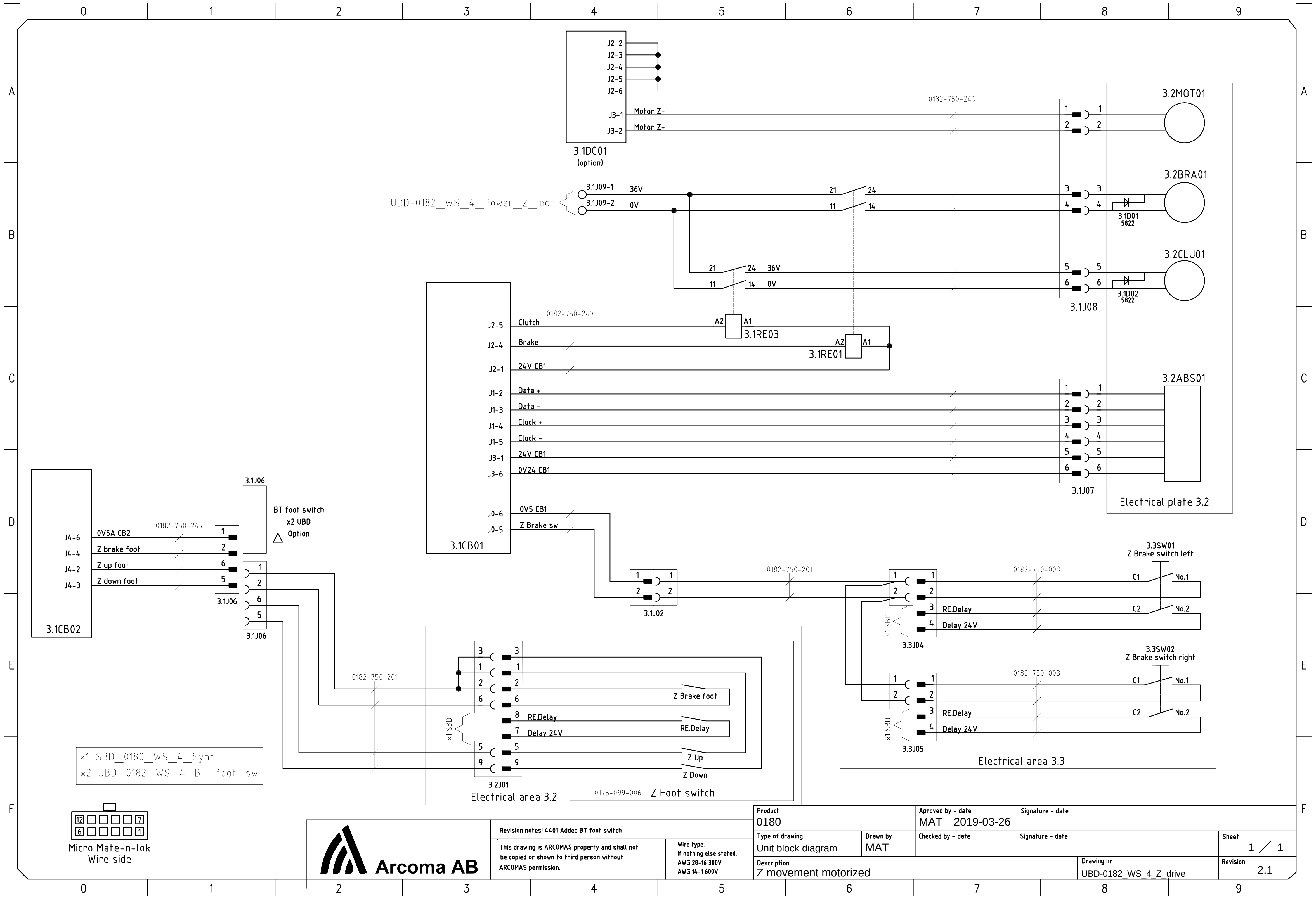
0182-750-202
0182-750-201
0182-750-248
J4
24V
24V
0V24
0V24
4.4FIB01
3.0J01
3.1J03
24V 3.1RE01-24
0V24 3.1RE01-14
UBD-0182_WS_4_Z_manual
J8
3.1CB01
3.1CB02
J1
3.1BCM01
Electrical plate 3.1
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! ÄBO 180914_01 Removed Relay 3.1RE01
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2019-05-22
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 1
Description
0182 WS 4 power
Drawing nr
UBD-0182_WS_4_Power
Revision
2.1



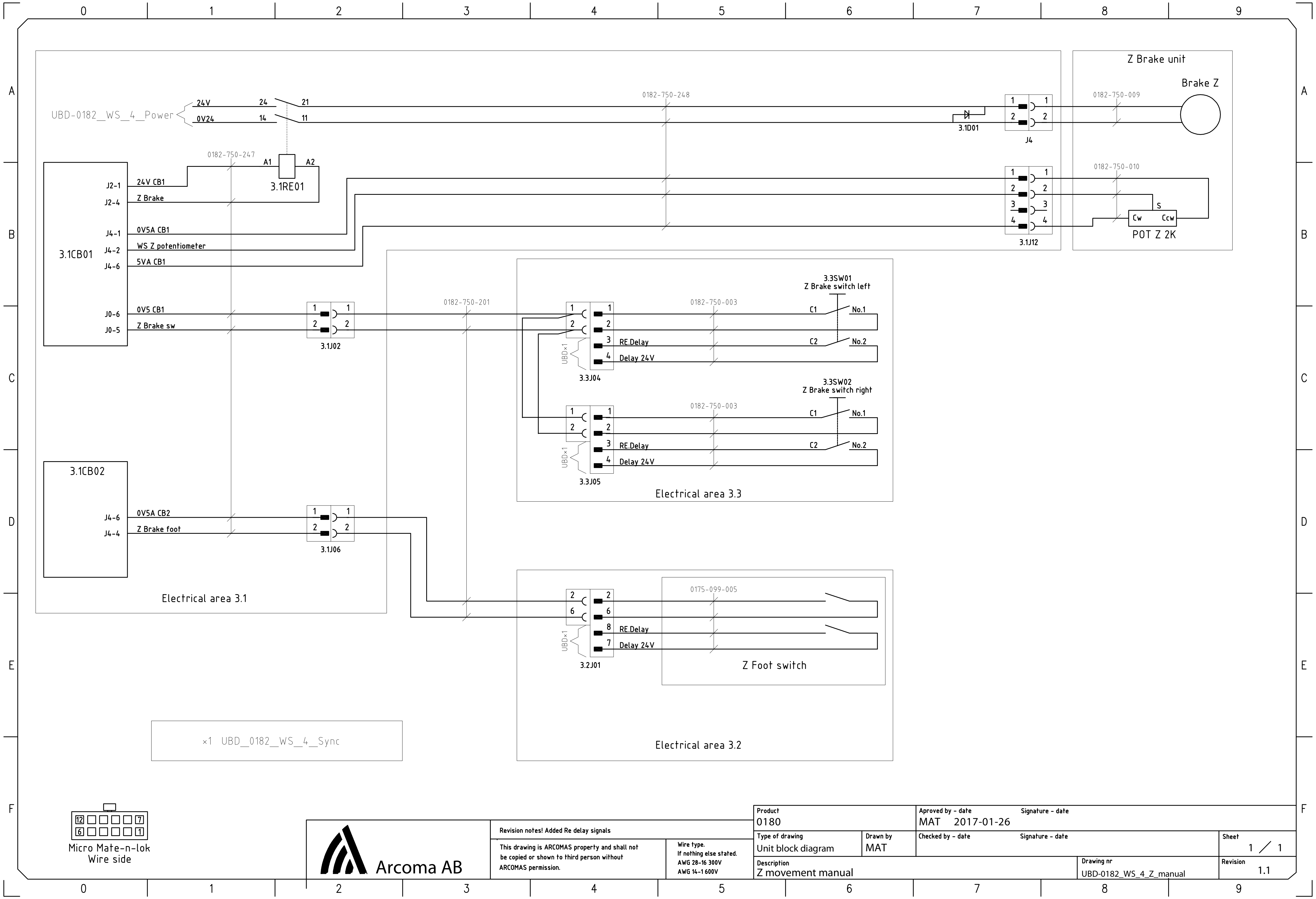
Arcoma AB	Revision notes! 4411 Added Bt foot swith		Product: 0180	Aproved by - date: MAT 2019-03-26 / Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Type of drawing: Unit block diagram / Drawn by: MAT	Checked by - date / Signature - date / Sheet: 1 / 1
			Description: Power motorized wallstand	Drawing nr: UBD-0182_WS_4_Power_Z_mot / Revision: 2.1



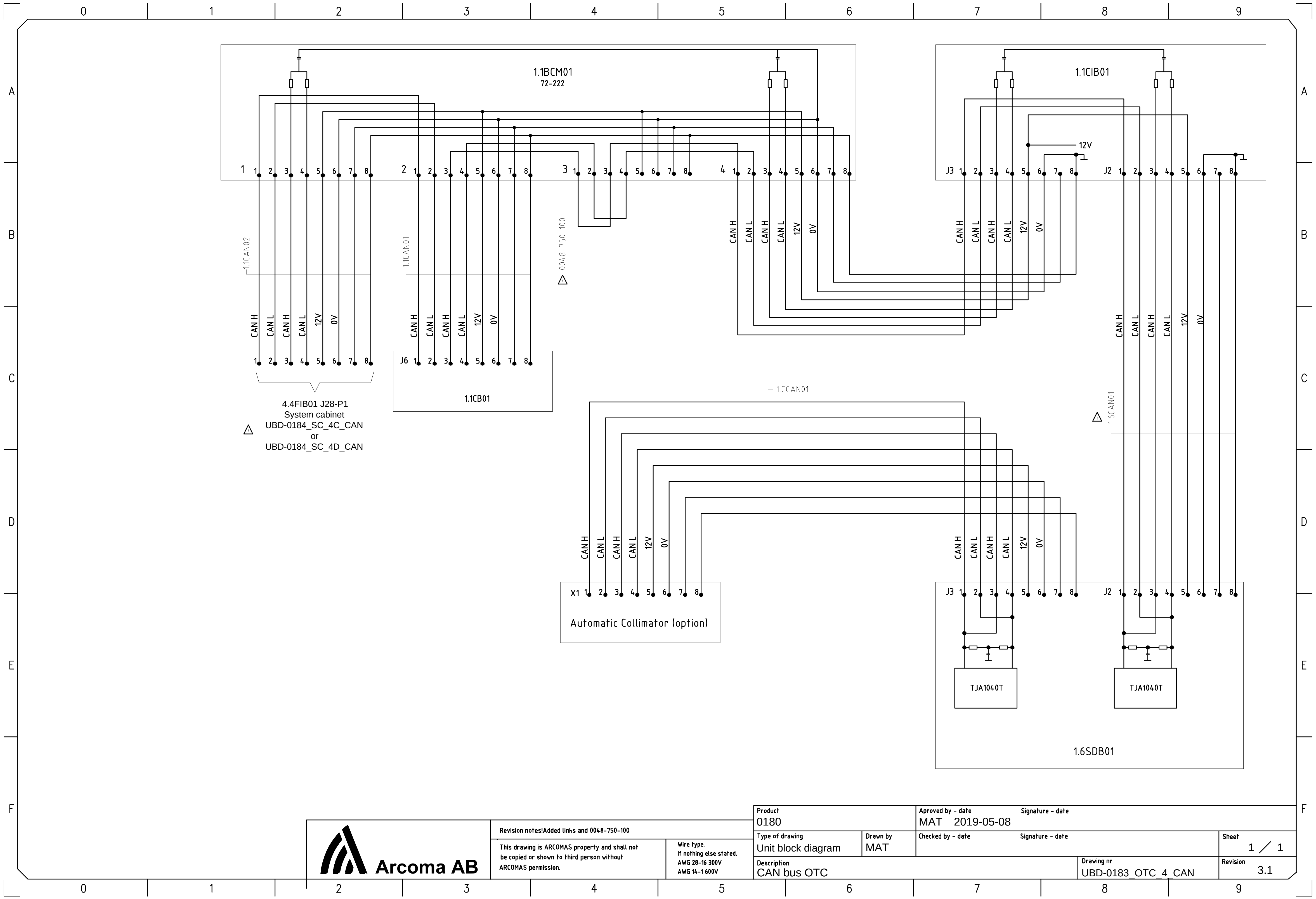
3.1CB01
J2-1
J2-2
24V CB1
WS Indication
0182-750-247
3.1J04
0182-750-201
Indication WS 72-601
J1
J0-6
J0-2
J0-3
0V5 CB1
Detector vertical
Detector horizontal
3.1J02
3.3J03
Tilt
0512-750-110
3.3SW01
3.3SW02
No tilt
0073-750-018
Electrical area 3.3
Electrical area 3.1
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-01-26
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Detector tilt and WS indication
Drawing nr
UBD-0182_WS_4_Tilt_Ind
Revision
1.1



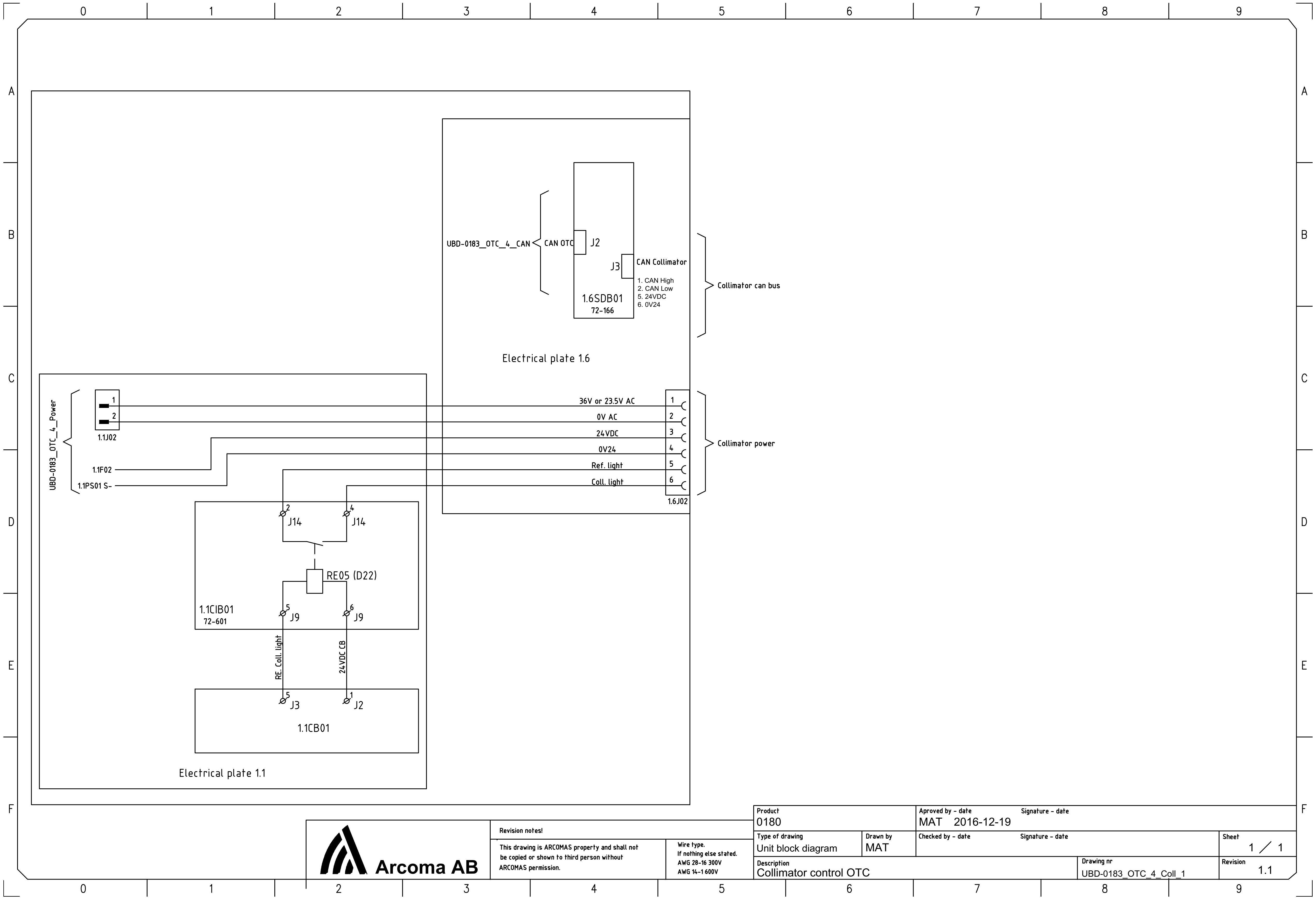
3.1DC01
(option)
Motor Z+
Motor Z-
3.2MOT01
3.2BRA01
3.2CLU01
3.2ABS01
UBD-0182_WS_4_Power_Z_mot
36V
0V
3.1D01
3.1D02
3.1J08
3.1J07
3.1RE03
3.1RE01
Clutch
Brake
24V CB1
Data +
Data -
Clock +
Clock -
0V24 CB1
0V5 CB1
Z Brake sw
3.1CB01
3.1CB02
0V5A CB2
Z brake foot
Z up foot
Z down foot
3.1J06
BT foot switch
x2 UBD
Option
Electrical plate 3.2
3.1J02
3.3SW01
Z Brake switch left
3.3SW02
Z Brake switch right
RE.Delay
Delay 24V
3.3J04
3.3J05
Electrical area 3.3
3.2J01
Electrical area 3.2
Z Brake foot
Z Up
Z Down
Z Foot switch
x1 SBD_0180_WS_4_Sync
x2 UBD_0182_WS_4_BT_foot_sw
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! 4401 Added BT foot switch
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2019-03-26
Type of drawing Unit block diagram
Drawn by MAT
Sheet 1 / 1
Description Z movement motorized
Drawing nr UBD-0182_WS_4_Z_drive
Revision 2.1

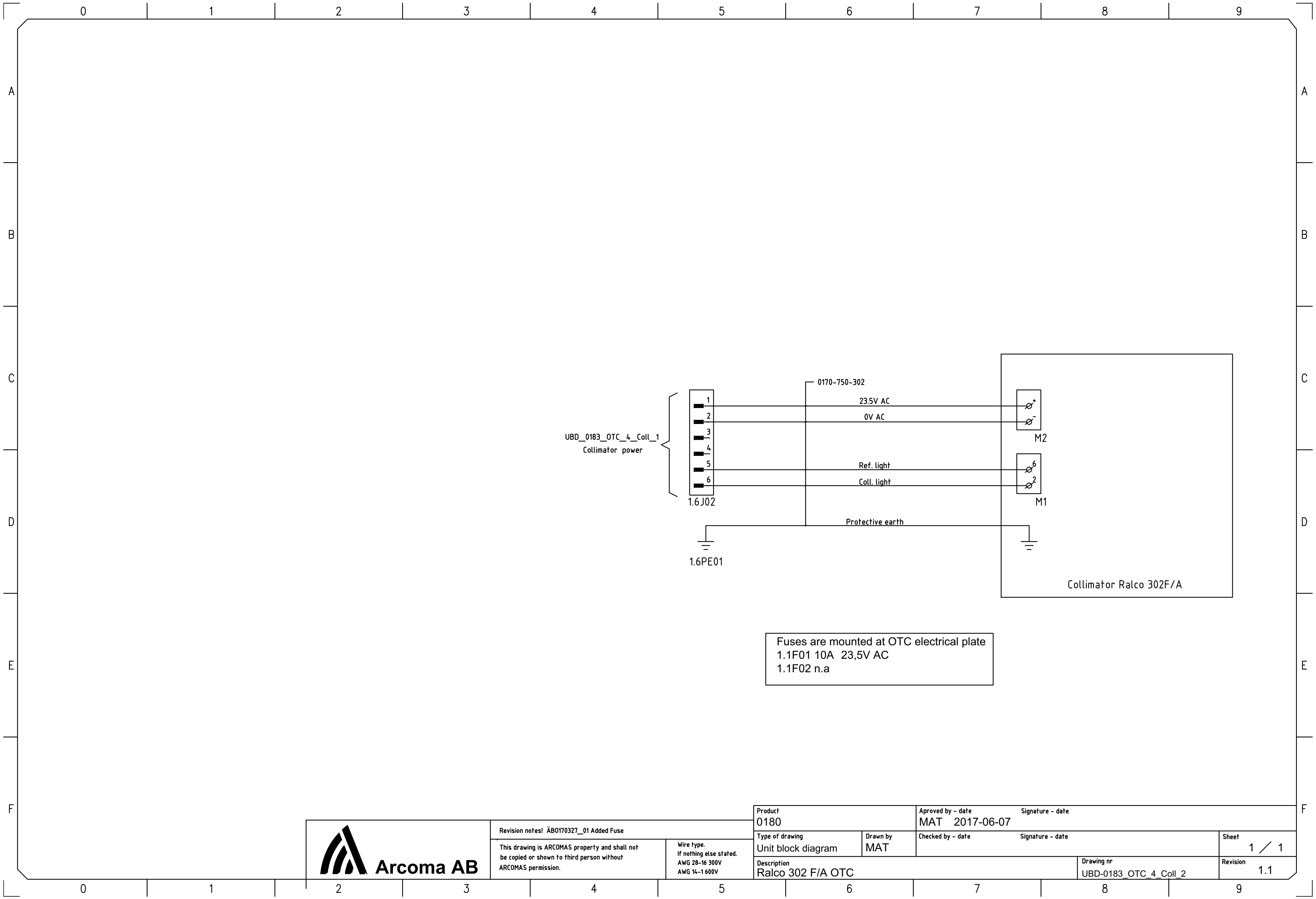


UBD-0182__WS__4__Power
24V
0V24
24
14
21
11
0182-750-248
0182-750-247
A1
A2
3.1RE01
3.1D01
J4
Z Brake unit
Brake Z
0182-750-009
0182-750-010
S
Cw
Ccw
POT Z 2K
3.1J12
3.1CB01
J2-1
24V CB1
J2-4
Z Brake
J4-1
0V5A CB1
J4-2
WS Z potentiometer
J4-6
5VA CB1
J0-6
0V5 CB1
J0-5
Z Brake sw
3.1J02
0182-750-201
0182-750-003
3.3SW01
Z Brake switch left
C1
No.1
C2
No.2
RE.Delay
Delay 24V
UBDx1
3.3J04
3.3SW02
Z Brake switch right
3.3J05
Electrical area 3.3
3.1CB02
J4-6
0V5A CB2
J4-4
Z Brake foot
3.1J06
Electrical area 3.1
0175-099-005
3.2J01
Z Foot switch
x1 UBD__0182__WS__4__Sync
Electrical area 3.2
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! Added Re delay signals
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-01-26
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Z movement manual
Drawing nr
UBD-0182_WS_4_Z_manual
Revision
1.1

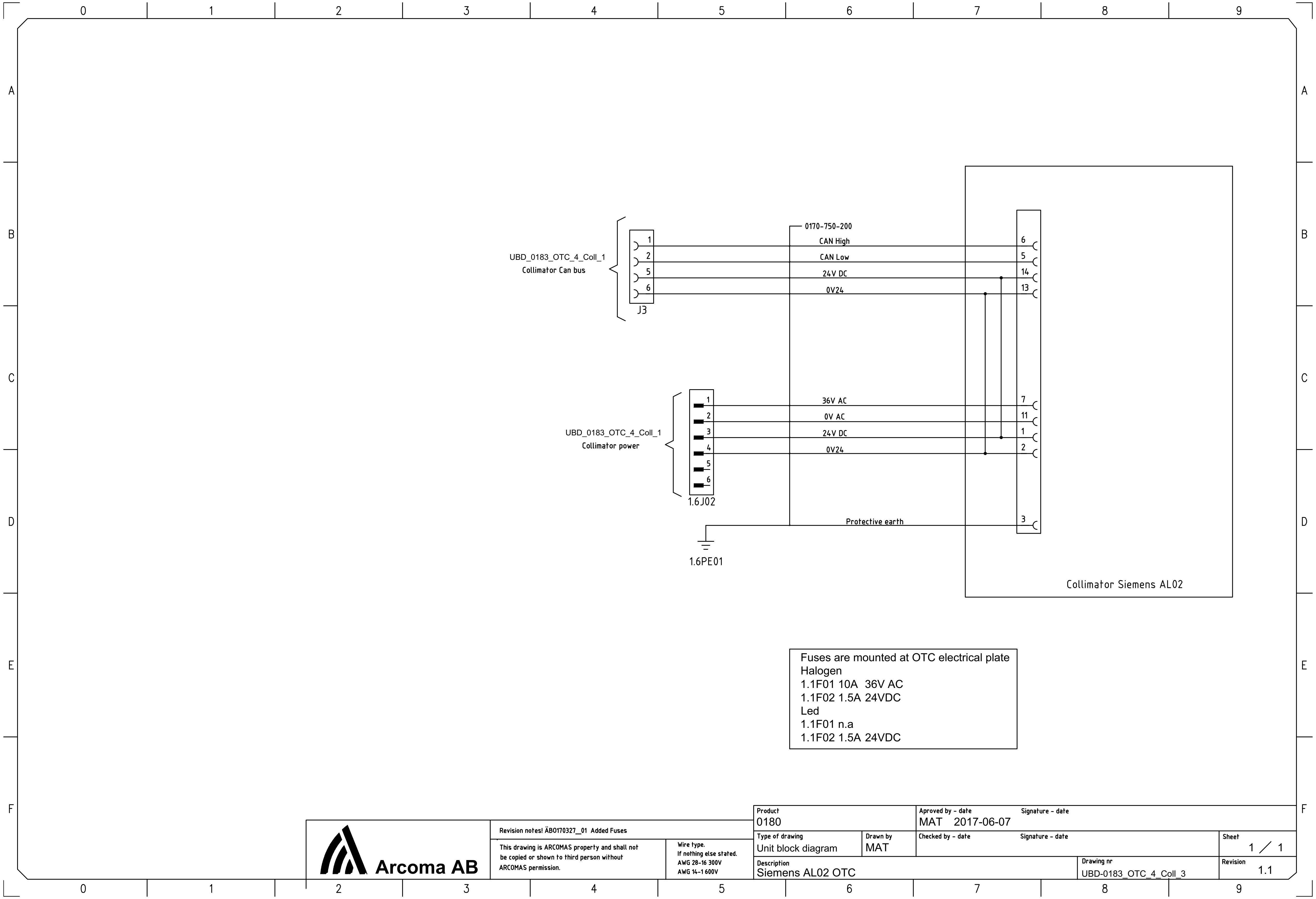


1.1BCM01
72-222
1.1CIB01
12V
CAN H
CAN L
12V
0V
1.1CAN02
1.1CAN01
0048-750-100
J6
1.1CB01
4.4FIB01 J28-P1
System cabinet
UBD-0184_SC_4C_CAN
or
UBD-0184_SC_4D_CAN
1.CCAN01
1.6CAN01
X1
Automatic Collimator (option)
J3
J2
TJA1040T
1.6SDB01
Arcoma AB
Revision notes!Added links and 0048-750-100
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2019-05-08
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CAN bus OTC
Drawing nr
UBD-0183_OTC_4_CAN
Revision
3.1

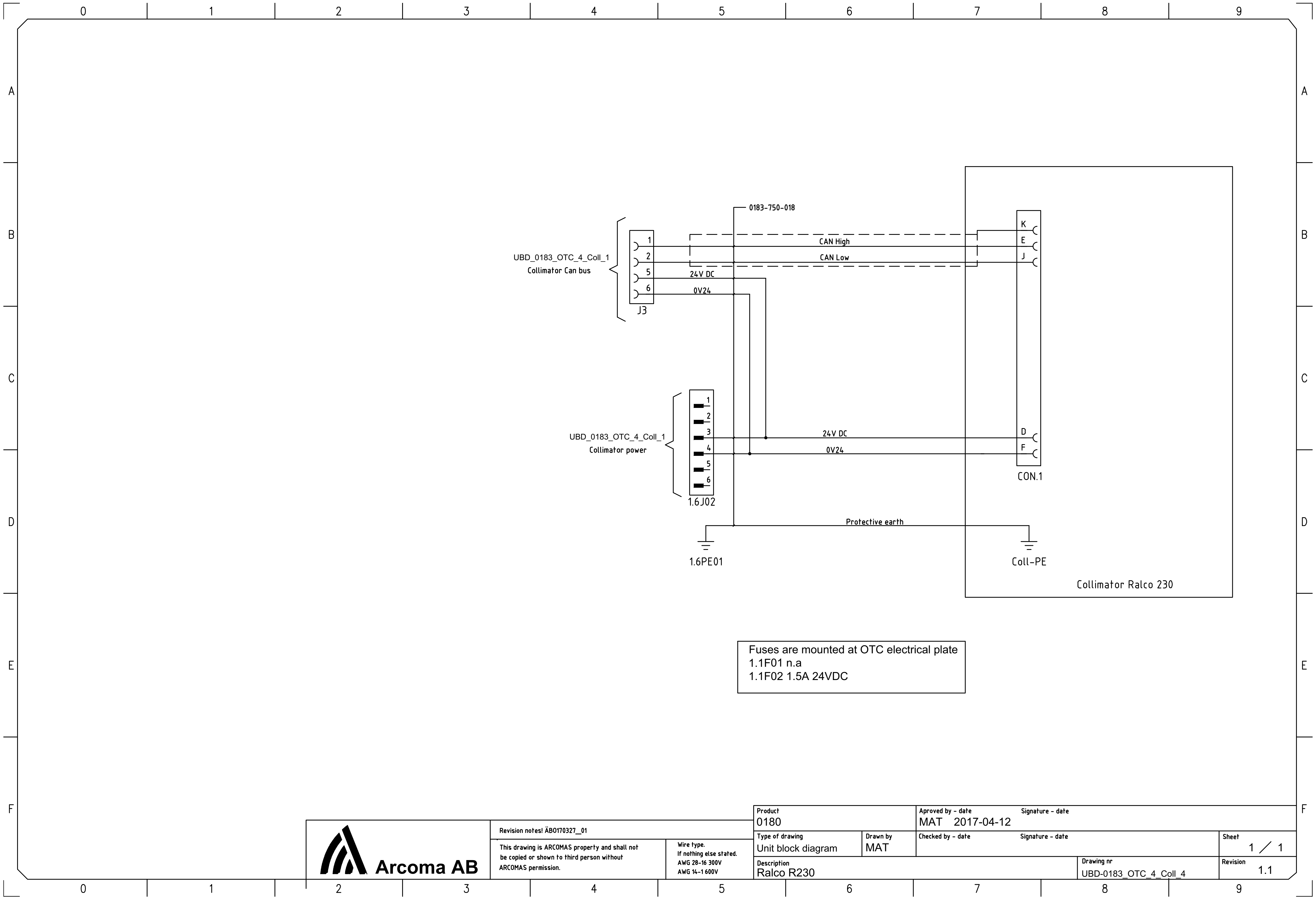

UBD-0183_OTC_4_CAN
CAN OTC
J2
J3
CAN Collimator
1. CAN High
2. CAN Low
5. 24VDC
6. 0V24
1.6SDB01
72-166
Collimator can bus
Electrical plate 1.6
UBD-0183_OTC_4_Power
1.1J02
1.1F02
1.1PS01 S-
36V or 23.5V AC
0V AC
24VDC
0V24
Ref. light
Coll. light
1.6J02
Collimator power
J14
J14
RE05 (D22)
1.1CIB01
72-601
J9
J9
RE. Coll. light
24VDC CB
J3
J2
1.1CB01
Electrical plate 1.1
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2016-12-19
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Collimator control OTC
Drawing nr
UBD-0183_OTC_4_Coll_1
Revision
1.1



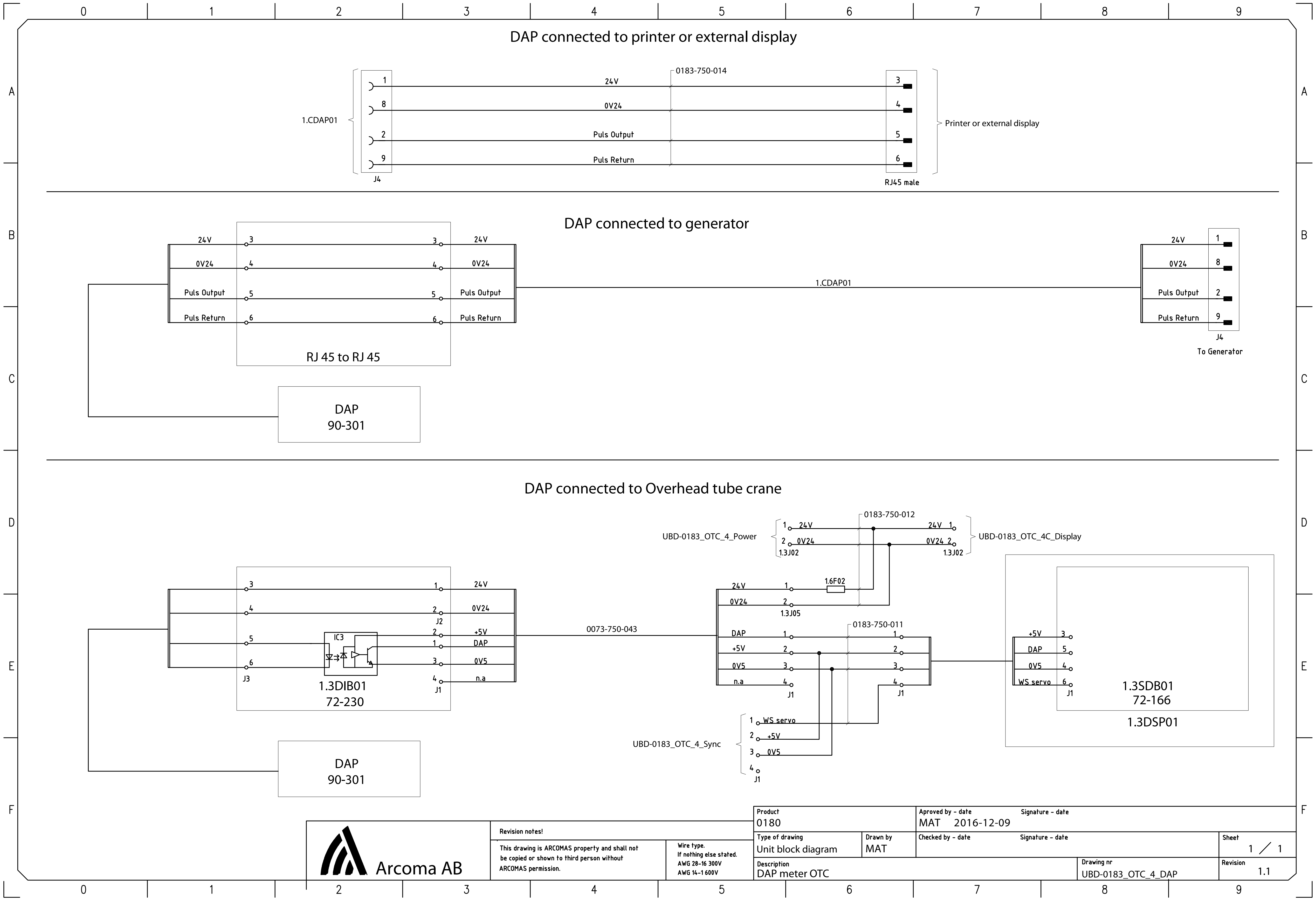
0170-750-302
23.5V AC
0V AC
Ref. light
Coll. light
Protective earth
UBD_0183_OTC_4_Coll_1
Collimator power
1.6J02
1.6PE01
M2
M1
Collimator Ralco 302F/A
Fuses are mounted at OTC electrical plate
1.1F01 10A 23,5V AC
1.1F02 n.a
Arcoma AB
Revision notes! ÄB0170327_01 Added Fuse
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2017-06-07
Signature - date
Type of drawing Unit block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description Ralco 302 F/A OTC
Drawing nr UBD-0183_OTC_4_Coll_2
Revision 1.1



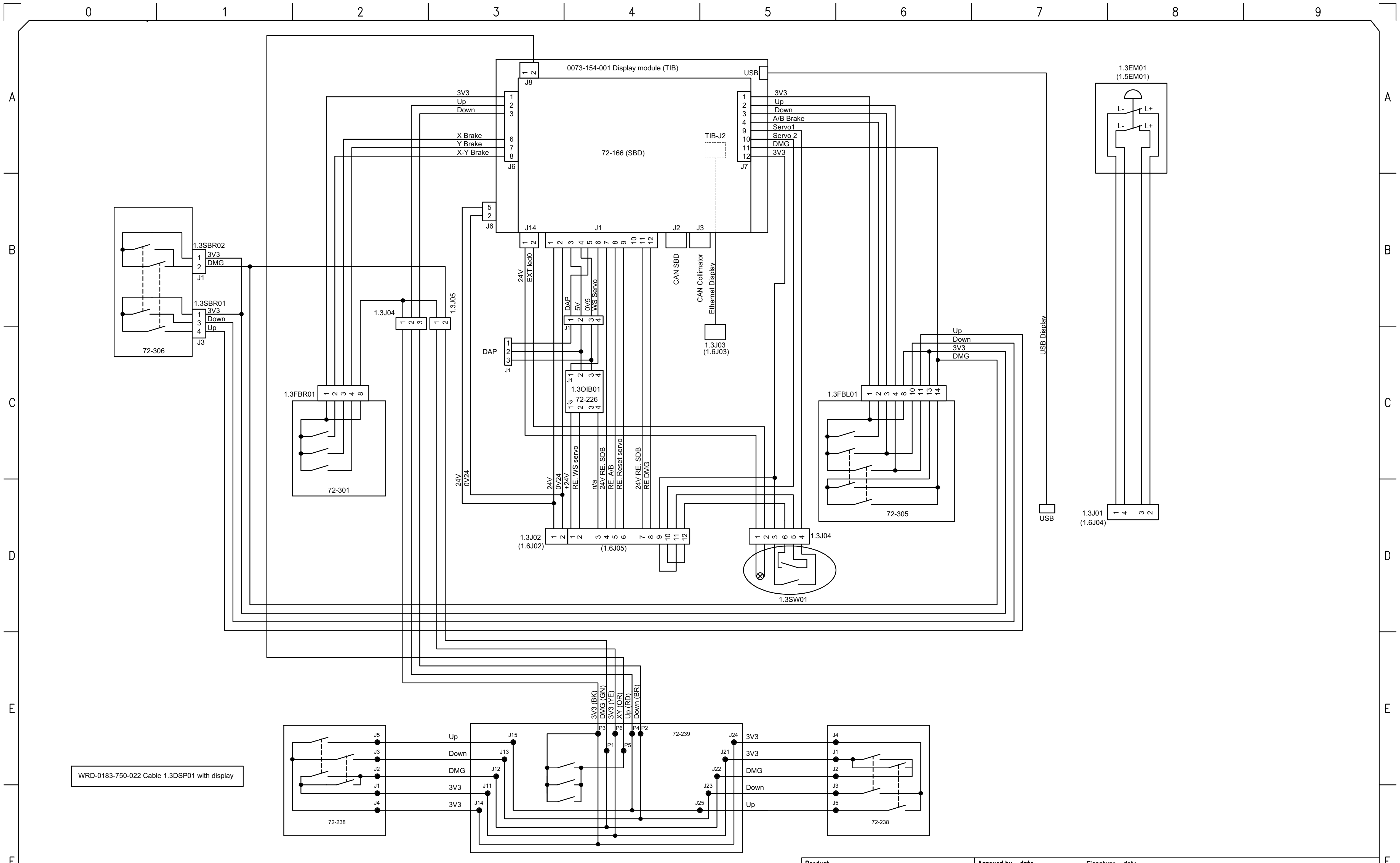
UBD_0183_OTC_4_Coll_1
Collimator Can bus
J3
0170-750-200
CAN High
CAN Low
24V DC
0V24
UBD_0183_OTC_4_Coll_1
Collimator power
1.6J02
36V AC
0V AC
24V DC
0V24
Protective earth
1.6PE01
Collimator Siemens AL02
Fuses are mounted at OTC electrical plate
Halogen
1.1F01 10A 36V AC
1.1F02 1.5A 24VDC
Led
1.1F01 n.a
1.1F02 1.5A 24VDC
Arcoma AB
Revision notes! ÄB0170327_01 Added Fuses
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2017-06-07
Signature - date
Type of drawing Unit block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description Siemens AL02 OTC
Drawing nr UBD-0183_OTC_4_Coll_3
Revision 1.1



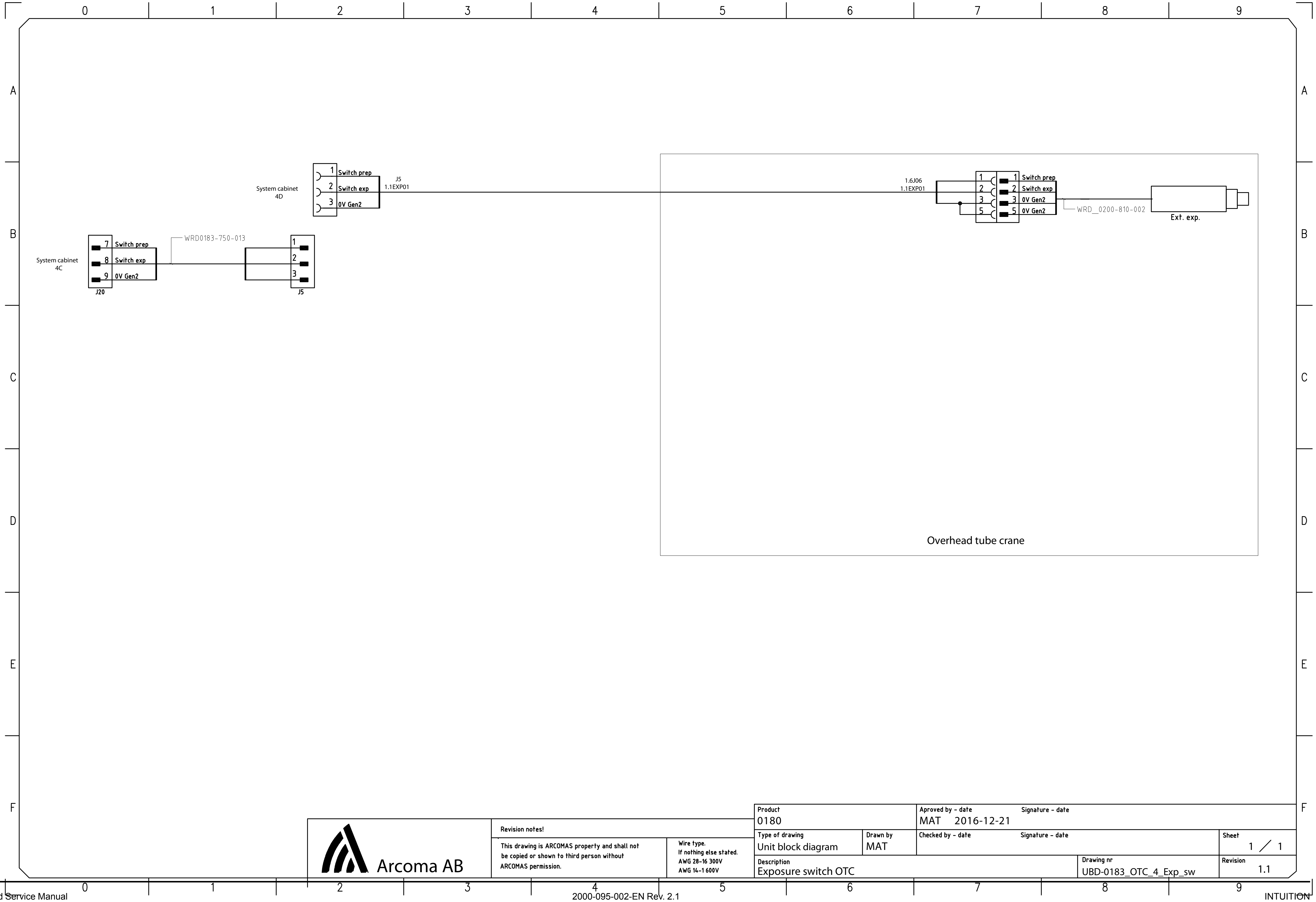
0183-750-018
UBD_0183_OTC_4_Coll_1
Collimator Can bus
J3
CAN High
CAN Low
24V DC
0V24
K
E
J
UBD_0183_OTC_4_Coll_1
Collimator power
1.6J02
24V DC
0V24
D
F
CON.1
Protective earth
1.6PE01
Coll-PE
Collimator Ralco 230
Fuses are mounted at OTC electrical plate
1.1F01 n.a
1.1F02 1.5A 24VDC
Arcoma AB
Revision notes! ÄB0170327_01
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-04-12
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Ralco R230
Drawing nr
UBD-0183_OTC_4_Coll_4
Revision
1.1

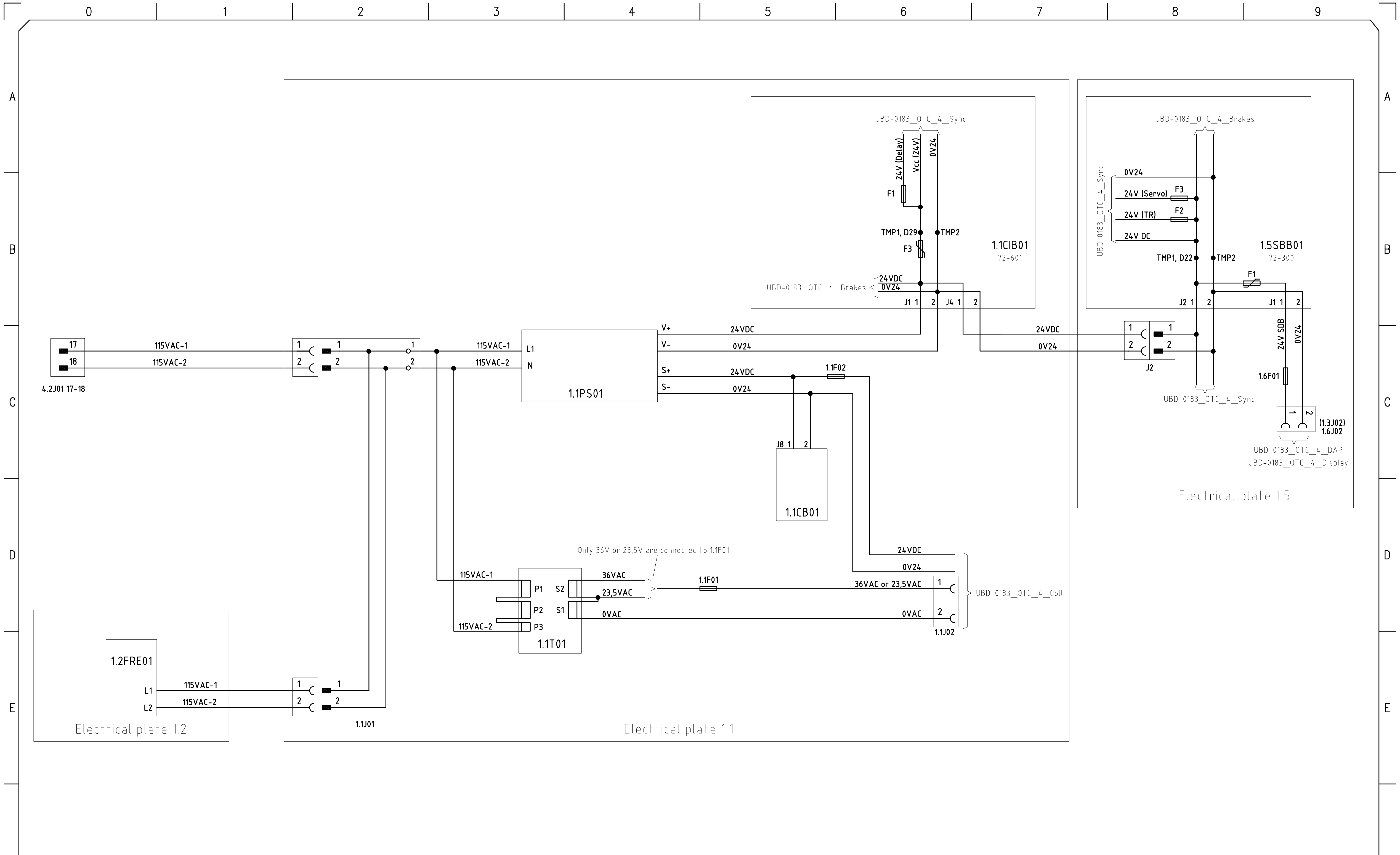


DAP connected to printer or external display
0183-750-014
1.CDAP01
24V
0V24
Puls Output
Puls Return
J4
RJ45 male
Printer or external display
DAP connected to generator
RJ 45 to RJ 45
1.CDAP01
J4
To Generator
DAP
90-301
DAP connected to Overhead tube crane
0183-750-012
UBD-0183_OTC_4_Power
UBD-0183_OTC_4C_Display
1.3J02
1.6F02
1.3J05
0183-750-011
0073-750-043
IC3
1.3DIB01
72-230
+5V
DAP
0V5
n.a
WS servo
1.3SDB01
72-166
1.3DSP01
UBD-0183_OTC_4_Sync
DAP
90-301
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0180
Aproved by - date MAT 2016-12-09
Signature - date
Type of drawing Unit block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description DAP meter OTC
Drawing nr UBD-0183_OTC_4_DAP
Revision 1.1



Revision notes!		Product 0180	Aproved by - date	Signature - date	
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Type of drawing: Unit block diagram	Drawn by: KNG	Checked by - date	Sheet 01 / 01
Arcoma AB		Description: Display unit OTC with DMG		Drawing nr: UBD-0183_OTC_4_DMG_Display	Revision 1.1


System cabinet
4D
1 Switch prep
2 Switch exp
3 0V Gen2
J5
1.1EXP01
System cabinet
4C
7 Switch prep
8 Switch exp
9 0V Gen2
J20
WRD0183-750-013
J5
1.6J06
1.1EXP01
1 Switch prep
2 Switch exp
3 0V Gen2
5 0V Gen2
WRD_0200-810-002
Ext. exp.
Overhead tube crane
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2016-12-21
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Exposure switch OTC
Drawing nr
UBD-0183_OTC_4_Exp_sw
Revision
1.1

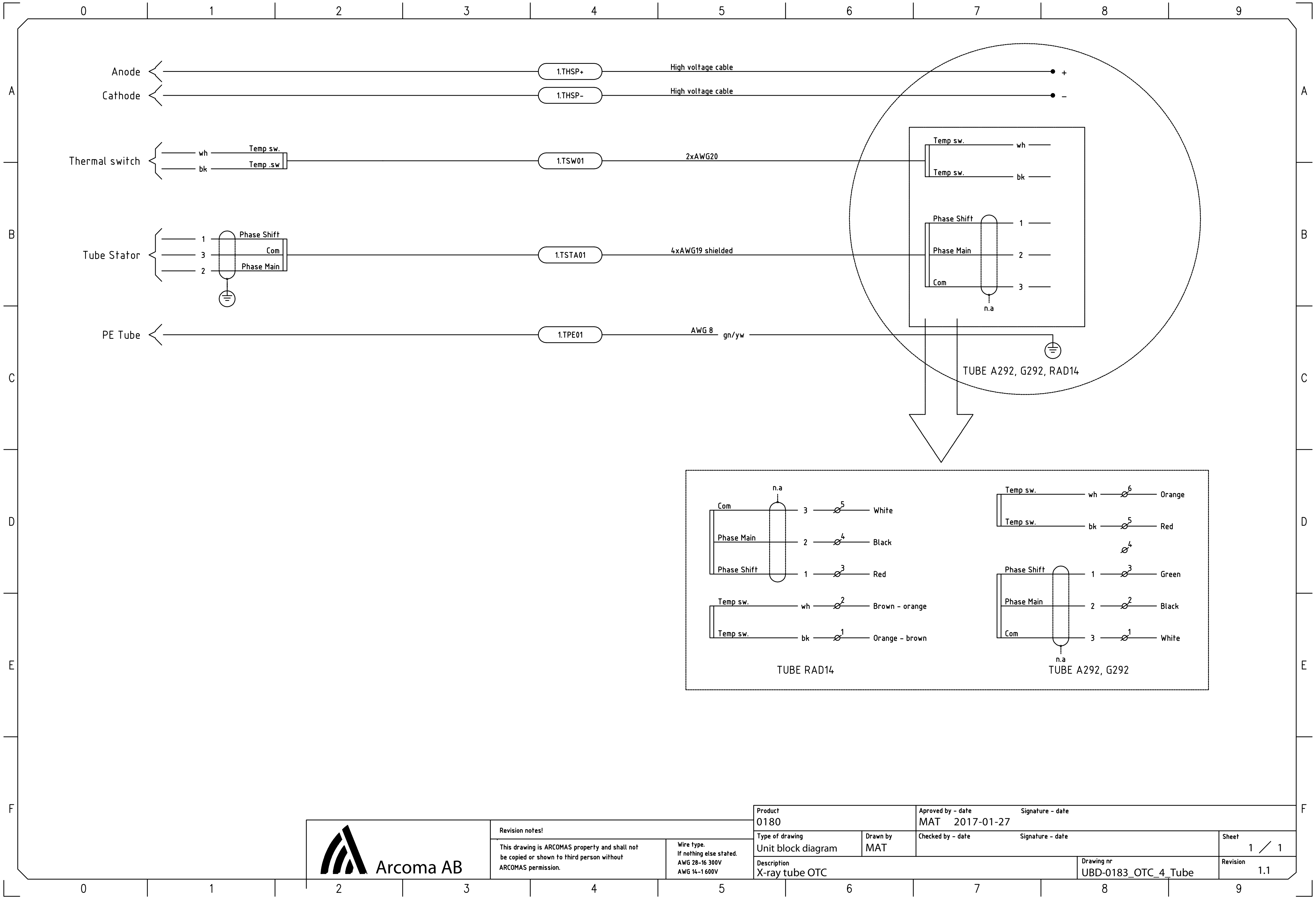


Product: 0180	Aproved by - date: MAT 2017-01-12	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Sheet: 1 / 1
Description: Power OTC		Drawing nr: UBD-0183_OTC_4_Power	Revision: 1.1

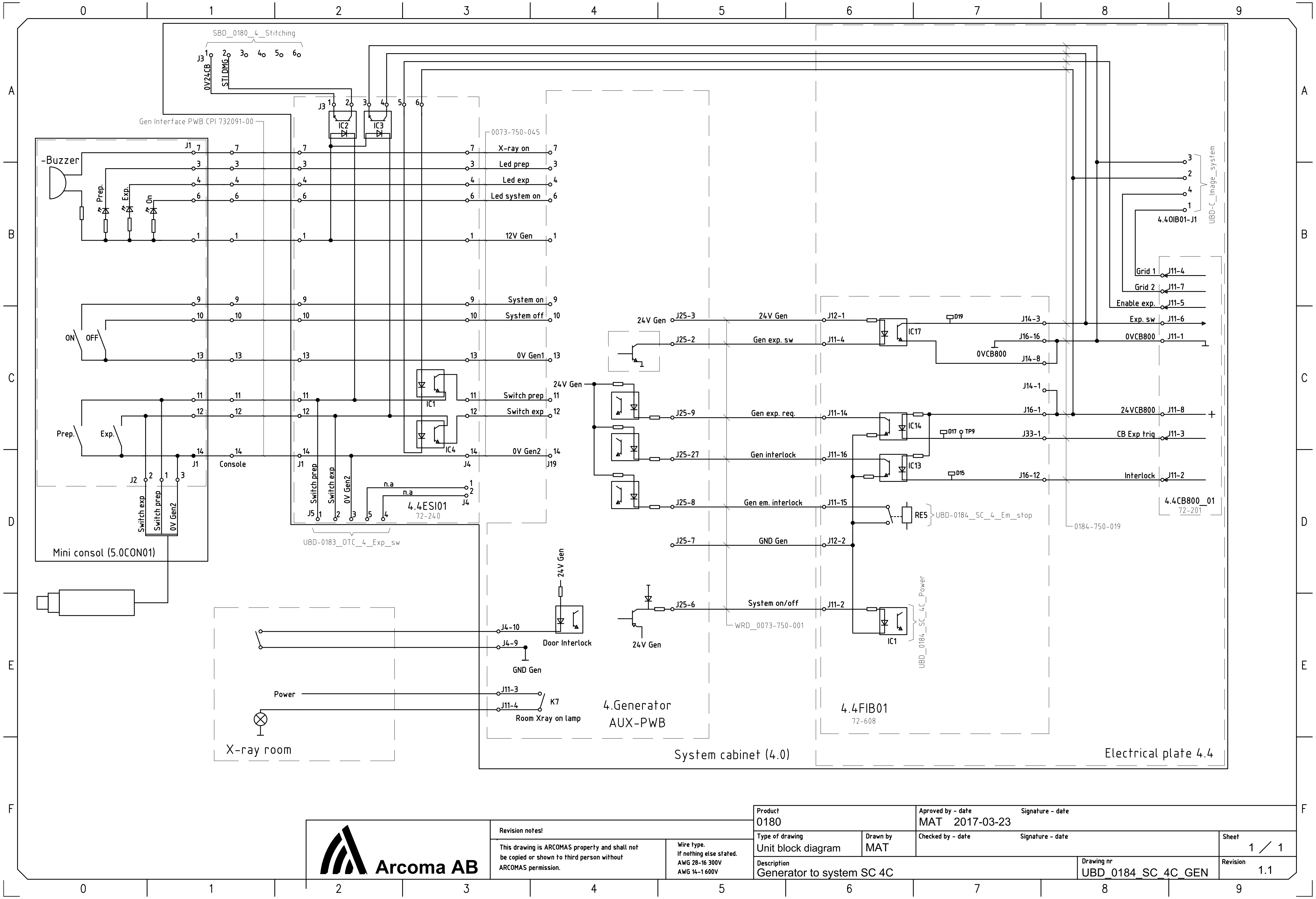
Arcoma AB

Revision notes!

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V



Anode
Cathode
1.THSP+
1.THSP-
High voltage cable
High voltage cable
+
-
Thermal switch
wh
bk
Temp sw.
Temp .sw
1.TSW01
2xAWG20
Tube Stator
1
3
2
Phase Shift
Com
Phase Main
1.TSTA01
4xAWG19 shielded
PE Tube
1.TPE01
AWG 8
gn/yw
Temp sw.
Temp sw.
wh
bk
Phase Shift
Phase Main
Com
n.a
TUBE A292, G292, RAD14
Com
Phase Main
Phase Shift
White
Black
Red
Temp sw.
Temp sw.
Brown - orange
Orange - brown
TUBE RAD14
Orange
Red
Green
Black
White
TUBE A292, G292
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0180
Aproved by - date
MAT 2017-01-27
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
X-ray tube OTC
Drawing nr
UBD-0183_OTC_4_Tube
Revision
1.1



Product	Aproved by - date	Signature - date
0180	MAT 2017-03-23	

Arcoma AB

Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Type of drawing	Drawn by	Checked by - date	Signature - date	Sheet
Unit block diagram	MAT			1 / 1

Description	Drawing nr	Revision
Generator to system SC 4C	UBD_0184_SC_4C_GEN	1.1

9 Fuses

The fuses part number, size, type, designation and function are listed in the table below. Turn off the power to the product when removing and replacing fuses. Replace only with the exactly same type of fuses.

9.1 OTC

Fuse chart electrical plate 1.1

Designation	Size	Type	Manufacturer	Function
1.1F01	10A	C60N 1P C10A	Schneider Electric/Merlin Gerin	Coll. Halogen lamp power
1.1F02	1.5A	326 series - SloBlo ceramic body 6.3x32 mm	Littlefuse	Coll. 24 VDC power

Fuse chart PCB 1.1CIB01

Designation	Size	Type	Manufacturer	Function
F1	100mA	217 series - Fast acting Glass body 5x20 mm	Littlefuse	Delay circuit table

Fuse chart PCB 1.5SBB01

Designation	Size	Type	Manufacturer	Function
F1	100mA	217 series - Fast acting Glass body 5x20 mm	Littlefuse	Delay circuit wallstand

Fuse chart 1.6

Designation	Size	Type	Manufacturer	Function
1.6F01	1.5AT	326 series - SloBlo ceramic body 6.3x32 mm	Littlefuse	Display 24 V power
1.6F02	0.5AT	313 series - SloBlo glass body 6.3x32 mm	Littlefuse	DAP 24V power

9.2 System Cabinet

Fuse chart electrical plate 4.2

Designation	Size	Type	Manufacturer	Function
4.2F01	C20A	C60N 3P C20A	Schneider Electric/Merlin Gerin	Mains power
4.2F02	C1A	C60N 1P C1A	Schneider Electric/Merlin Gerin	Internal 230 VAC
4.2F03	C6A	C60N 2P C6A	Schneider Electric/Merlin Gerin	Ceil 2x115 VAC
4.2F04	C6A	C60N 2P C6A	Schneider Electric/Merlin Gerin	Table 2x115 VAC
4.2F05	C6A	C60N 1P C6A	Schneider Electric/Merlin Gerin	Detectors 230 VAC

9.3 Two Column Table (option)

Fuse chart electrical plate 2.1

Designation	Size	Type	Manufacturer	Function
2.1F01	6A	C60N 1P C6A	Schneider Electric Merlin Gerin Eaton	24 VDC Logic

Fuse chart 2.1DC01 and 2.1DC02

Designation	**Size**	**Type**	**Manufacturer**	**Function**
2.1DC01–F1	15A	326 series - 3AG SloBlo glass body 6.3x32 mm	Littlefuse	36 VDC motor power
2.1DC02-F1	15A	326 series - 3AG SloBlo glass body 6.3x32 mm	Littlefuse	36 VDC motor power

9.4 Wallstand Z Manual

Fuse chart 4.4FIB01 placed in the system cabinet

Designation	Size	Type	Manufacturer	Function
4.4FIB01–F3	3AT	326 series - 3AB SloBlo ceramic body 6.3x32 mm	Littlefuse	WS 24 V Logic

9.5 Wallstand Z Motorized

Fuse chart 4.4FIB01 placed in the system cabinet

Designation	Size	Type	Manufacturer	Function
3.1F01	10AT	326 series - 3AB SloBlo ceramic body 6.3x32 mm	Littlefuse	36 VDC Z-motor
3.1F02	3AT	326 series - 3AB SloBlo ceramic body 6.3x32 mm	Littlefuse	WS 24 V Logic

10 Complying Standards

IEC 60601-1:2005+AMD1:2012+AMD2:2020 (edition 3.1)

– Medical electrical equipment: General requirements for basic safety and essential performance.

IEC 60601-1-2:2014 (4th edition)

– Medical electrical equipment : General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances - Requirements and tests.

IEC 60601-1-3:2008+AMD1:2013

– Medical electrical equipment: General requirements for basic safety and essential performance - Collateral Standard: Radiation protection in diagnostic X-ray equipment.

IEC 60601-1-6:2010+AMD1:2013+AMD2:2020

– Medical electrical equipment: General requirements for basic safety and essential performance - Collateral standard: Usability.

IEC 62304:2006+AMD1:2015

– Medical device software - Software lifecycle processes.

IEC 62366-1:2015

– Medical devices - Part 1: Application of usability engineering to medical devices.

IEC 60601-2-28:2017

– Medical electrical equipment: Particular requirements for the basic safety and essential performance of X-ray tube assemblies for medical diagnosis.

IEC 60601-2-54:2009+AMD1:2015+AMD2:2018

– Particular requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy.

EU Machinery Directive 2006/42/EC

11 Technical Specification

11.1 Classification

Classification according to IEC/EN 60601-1.

Class	Class I equipment. All dead metal parts of the equipment are electrical connected to protective earth.
Applied part	Type B
Protection against ingress of water	IPX0
Mode of operation	Intermittent operation: 20% 1 min ON / 4 min OFF
Use of anesthetic mixtures	The equipment is not suitable for use in the presence of flammable anesthetics mixtures with air, oxygen or nitrous oxide.

Classification according to IEC/EN 60601-1–2 Ed 3.0 2007 Class A.

Class	Class A

11.2 Power Requirements

Mains voltage for the System	400VAC 3Phase+N, +/-10%, 50/60Hz 400VAC 3Phase, +/-10%, 50/60Hz 480VAC 3Phase, +/-10%, 50/60Hz Long-time (positioning) 2 A 50/60 Hz. Momentary (exposure):150 A, 50/60 Hz (Short term peak value), (recommended fuse 63 A, thermal breaker, B curve.) Class 1
Heat dissipation	689 BTU/hr

11.3 Power Line Requirements

Generator Series and Mains Voltage	Generator Momentary Line Current	Apparent Mains Resistance	Recommended Minimum			
			Mains Disconnect to Generator (15 ft/5 m max)	Generator Service Rating	Distribution Transformer Rating	Ground Wire Size
50 kW 400 VAC, 3p	100 A	0.17 Ω	13.3 mm² (AWG 6)	100 A	65 kVa	13.3 mm² (AWG 6)
65 kW 400 VAC, 3p	125 A	0.13 Ω			85 kVa	
80 kW 400 VAC, 3p	155 A	0.10 Ω			105 kVa	
50 kW 480 VAC, 3p	80 A	0.24 Ω			65 kVa	
65 kW 480 VAC, 3p	105 A	0.19 Ω			85 kVa	
80 kW 480 VAC, 3p	130A	0.15 Ω			105 kVa	

11.4 Radiographic Specification

Radiographic performance	
kVp range:	40 to 150 kV
kVp steps:	variable in 1 kV steps
kVp accuracy:	± (5 % + 1 kV) measured 5 ms after the beginning of the exposure: ±2% between 70-80 kVp
Rise time (10-90%):	< l.5 ms (typically< 1.0 ms) with 30 m (100 ft) Locaflex L3 or equivalent HV cables (4.4 μF ±10%)
Time range:	1.0 to 6300 ms
Exposure time steps:	Variable in 1 ms steps via protocol: Variable according to ISO 497 Series R'20 via console
Exposure time accuracy:	± (2% + 0.5 ms) from 5 ms to 6300 ms and > 0.5 mAs ± (10% + 1 ms) for > 0.1 mAs and for < 5 ms or ≤ 0.5 mAs for 30 m (100 ft) HV cables
mAs range:	0.1 to 630 mAs (50 kW) 0.1 to 800 mAs (65 kW) 0.1 to 1000 mAs (80 kW) Note for Minimum mAs: mAs Mode: 0.3 mAs (> 60 kV, 28 mA, 11 ms) mA, ms Mode: 0.3 mAs (> 60 kV, 10 mA, 30 ms) mAs or mA, ms Mode: 0.1 m As (40 - 60 kV, 10 mA, 10 ms)
mAs accuracy:	± (10 % + 0.2 mAs) ± (10% + 0.05) mAs: 0.1 mAs - 0.5 mAs (preliminarily specified for the range beyond IEC standard
mA range:	10 to 630 mA (50 kW) 10 to 800 mA (65 kW) 10 to 1000 mA (80 kW
mA steps:	Variable in 0.1 mAs steps via protocol: Variable according to ISO 497 Series R'20 via console

Radiographic performance	
mA Accuracy (10 mA -1000 mA):	± (5% +1 mA) for exposures ≥ 5 ms and > 0.5 mAs: ± (20%) mA for exposures > 0.1 mAs and for< 5 ms or: ≤ 0.5 mAs: (0.1- 0.25 mAs, mA 50 mA)
Coefficient of linearity:	≤ 0.1 for kV and mAs parameters
Coefficient of reproducibility:	≤ 0.05 (Station to Station) for exposures ≥25 mA or 3.2 ms
Duty Cycle:	Not to exceed 5 consecutive boosts, followed by a minimum 10 second wait period

Output Parameter and Loading Factor		
Output Parameter	**Generator Series**	**Loading Factor**
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	50 kW 65 kW 80 kW	150 kV, 320 mA 150 kV, 400 mA 150 kV, 500 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	50 kW 65 kW 80 kW	630 mA, 80 kV 800 mA, 81 kV 1000 mA, 80 kV
Combination of X-ray tube current and X-ray tube voltage resulting in highest output power	50 kW 65 kW 80 kW	500 mA, 100 kV, 0.1 s 630 mA, 100 kV, 0.1 s 800 mA,100 kV, 0.1 s
Nominal shortest irradiation time (AEC exposures)	All models (AEC control is available over the full kV and mA range)	< 2 ms with a dedicated or 3 of 5 field AEC board AEC control is achieved by varying the ms of the exposure. The AEC ms range is 15 ms to an installer-programmable maximum not to exceed 600 mAs.

11.5 X-ray Tube

Inherent filtration	0.7 mm Al/75KV
Added filtration	0.8 mm Al
Total filtration	1.5 mm Al (0.7+0.8)

For more detailed x-ray tube technical specifications, see the provided tube insert and housing datasheets.

11.6 Environmental Requirements

Ambient transport and storage temperature	-40 °C - +70 °C
Ambient operating temperature	+10 °C - +40 °C
Transport and storage humidity (relative)	10-90%, non-condensing
Operating humidity (relative)	30-75%, non-condensing
Atmospheric pressure range for transport, storage and operation	1060–700 hPa (-400 to +3000 meter, 795 to 525 mm Hg)

11.7 OTC

11.7.1 General

Rotation range ceiling (beta)	- 193°(±5°) ~ +155°(±10°)
Rotation range tube arm (alpha)	+193°(±5°) ~ -155°(±10°)
Column (Z stroke)	1700 mm, 1450 mm

11.7.2 Weight

OTC	127 kg
Tube and collimator	40 kg maximum allowed weight
Traverse rail X	60 kg
Ceiling rail Y (4 m standard)	16 kg

11.7.3 Speed

	Low speed	**Maximum speed**
Z movement	40 mm/s	150 mm/s

11.8 Cabinet

11.8.1 General

Dimensions (L x W x H) mm	750 x 610 x 1130

11.9 Closed Table

11.9.1 Maximum Patient Load

Maximum patient load	295 kg

11.9.2 Weight of Parts

Table (with table top and vertical lift)	241 kg
Table top	47 kg
Vertical lift	14 kg

11.9.3 Vertical Lift

Lowest table top position (from the floor to the table top surface)	540 +20/–10 mm
Z stroke	310 +40/–20 mm
Maximum travel speed	25 mm/s (MRS ≥30 mm/s)

11.9.4 Table Top

Dimensions	2400 mm X 800 mm
X-ray transparent area	2350 mm X 580 mm
Thickness	21 mm
Length of stroke X-direction from center position (Longitudinal)	±500 +20/–10 mm
Length of stroke Y-direction from center position (Lateral)	±150 +20/–10 mm
Aluminum equivalence	≤0.9 mm
Aluminum equivalence cover detector holder	< 0.6 mm

11.10 Two Column Table (option)

11.10.1 General

11.10.1.1 Column

Two column table, with motorized vertical movement

Lowest table top position (from the floor to the table top surface)	550 mm
Column (Z stroke)	380 mm

11.10.1.2 Table top

Two Column Table with Manual or Motorized Detector Movement

Dimensions	2400 mm X 853 mm
X-ray transparent area	2400 mm X 601 mm
Thickness	21.5 mm
Length of stroke, X-direction	+/- 600 mm
Length of stroke Y-direction	+/- 150 mm
Movement range of the detector	up to 850 mm
Aluminum equivalence	0.9 mm
Aluminum equivalence cover detector holder	< 0.6 mm

11.10.1.3 Weight

Two column table, compl.	Maximum 147 kg
Table top	Maximum 47 kg
Maximum patient load	300 kg

11.11 Wallstand

Column, Z stroke	1470 +40/-10 mm (non-tilt) 1400 +40/-10 mm (tilt)

Rotation range detector holder wagon (Only the tiltable detector holder wagon).	-20° - 90°

11.11.1 Attenuation Equivalent

Detector holder	<=0.6 mm

11.11.2 Weight

Wallstand	Maximum 180 kg (160 +20/ -20 kg)

11.12 Detectors

The following detector options are available for the system:

CXDI-401C, wireless 43x43
CXDI-401C, 43x43 compact
CXDI-410C, wireless 43x43
CXDI-701C, wireless 35x43
CXDI-710C, wireless 35x43
CXDI-801C, wireless ~28x35
CXDI-810C, wireless ~28x35
CXDI-402C, wireless 43x43
CXDI-702C, wireless 35x43

12 Spare parts

12.1 General

Note!

Contact the manufacturer for information about how to exchange spare parts.

Arcoma part no.	Part description	Dimensions (cm)	Weight (kg)
0055-810-005	Foot switch strip X/ Y	130x12x9	0.9
0055-810-008	Manoeuvre handle Tomo TS	24x19x10	0.8
0055-810-009	Manoeuvre handle coll TS	24x19x10	0.7
0055-810-010	PCB CB/DC/20 incl. software	25x20x17	1.7
0055-810-014	Signal lamp	24x19x10	0.2
0055-810-016	Emergency stop	24x19x10	0.3
0055-810-020	Relay Omron, 11 pcs	24x19x10	0.5
0055-810-025	Relay emergency stop	24x19x10	0.4
0055-810-030	Tilt sensor	24x19x10	0.3
0055-810-031	End covers, table top	24x19x10	0.2
0055-810-035	PCB GB Kit	25x20x11	0.3
0055-810-041	Table top (Al eq 0,9)	247x90x8	73
0055-810-043	Table top (Al eq 0,7)	247x90x8	73
0055-810-045	Load cell	24x19x10	1.1
0055-810-060	Insulation kit for foot plate	44x33x10	0.9
0055-810-065	Shim foot plate	60x40x10	16.8
0055-810-085	Cable kit brake X/Y	24x19x10	0.5
0055-810-090	Fuse 15A (5pcs)	24x19x10	0.2
0055-810-110	BCM box cpl.	24x19x10	0.4
0055-810-201	Table column right	80x60x93	68
0055-810-205	Table column left	80x60x93	68
0055-810-552	Brake unit table top (left mounted)	28x20x10	1.4

Arcoma part no.	Part description	Dimensions (cm)	Weight (kg)
0055-810-553	Brake unit table top (right mounted)	28x20x10	1.4
0055-810-750	Covers table footside	60x40x27	1.8
0055-810-755	Covers table headside	60x40x26	1.9
0055-815-760	PCB OVP	28x20x10	0.4
0070-811-261	Buttons manoeuvre handle	24x19x10	0.3
0072-810-005	Side covers, handlebar TS	24x19x10	0.2
0072-810-007	Foot pedal brake WS	24x19x10	1.3
0072-810-008	Foot control Z WS	46x33x11	3
0072-810-009	Manoeuvre handle coll WS		
0073-810-001	Manoeuvre display cpl. (Loop) CS		
0073-810-010	Cover display front CS		
0073-810-011	Cover display back CS		
0073-810-014	PCB SDB		
0073-810-608	PCB FIB		
0170-810-002	Microswitches Alpha	28x20x10	0.5
0170-810-006	Magnet Alpha/Beta	24x19x10	0.9
0170-810-009	Elastic band	24x19x10	0.3
0170-810-020	Kit traverse Y	24x19x10	0.8
0170-810-040	Encoder Z	24x19x10	0.6
0170-810-056	Relay SC (4.2Re01)	.24x19x10	0.8
0170-810-066	Transformer, coll. 12-066	24x19x10	2.3
0170-810-093	Endstop adjustable, traverse	24x19x10	0.6
0170-810-101	PCB CB 70-106	24x19x10	0.6
0170-810-168	Transformer #1 SC	38x29x20	7.5
0170-810-169	Transformer #2 SC	24x19x10	2.3

Arcoma part no.	Part description	Dimensions (cm)	Weight (kg)
0170-810-223	Covers ceiling wagon CS	80x60x50	9.0
0170-810-225	Tube covers RAD14 CS	59x40x27	2.5
0170-810-232	Covers beta CS	40x40x24	1.7
0170-810-235	Tube covers B130 CS	59x40x27	2.5
0170-810-238	Brake unit X/Y	24x19x10	0.5
0170-810-240	Height sensor 1700	24x19x10	1.0
0170-810-241	Height sensor 1450	24x19x10	1.0
0170-810-305	Column complete 1450 mm	80x60x65	66.5
0170-810-306	Column complete 1700 mm	80x60x65	68.0
0170-810-601	PCB CIB 72-601	24x19x10	0.4
0170-810-602	PCB SBB 72-602	24x19x10	0.3
0175-810-050	Rubber endstops WS	24x19x10	0.3
0175-810-117	Gas spring tilt WS 400 Nm	24x19x10	0.7
0175-810-610	PCB PLB indicator lamp WS	24x19x10	0.2
0181-810-003	Cable kit Z TS		
0181-810-005	Foot control X/Y/Z TS		
0181-810-006	Cable kit DH TS	24x19x10	
0181-810-007	Cable kit guard TS	24x19x10	
0181-810-008	Manoeuvre handle XYZ TS		
0181-810-009	Manoeuvre handle coll TS		
0181-810-010	Potentiometer Z TS 10 kΩ	24x19x10	
0181-810-015	Cable kit kick box TS		
0181-810-016	Cable kit end stop Z TS		

Arcoma part no.	Part description	Dimensions (cm)	Weight (kg)
0181-810-018	Cable kit emergency stop TS		
0181-810-020	Drive unit Z TS		
0181-810-021	Cable, wagon		
0181-810-040	Cover upper TS		
0181-810-044	Table top		
0181-810-050	Cover front, lower TS		
0181-810-055	Cover back, lower TS		
0181-810-063	Frequency converter TS		
0181-810-066	Button brake release detector holder TS	24x19x10	
0181-810-100	DH table target cover TS		
0181-810-102	Drive belt Z TS PJ889		
0181-810-110	Brake unit X/Y TS		
0181-810-115	Brake unit Y TS		
0181-810-176	End covers table top 4 pcs L/R	24x19x10	
0181-810-204	Magnet unit detector holder TS	24x19x10	
0181-810-205	Cable kit switches detector holder TS		
0181-810-301	Toothbelt brake X AT5/600 8 mm	24x19x10	
0181-810-353	PCB TCB table connection board	29x20x10	
0181-810-980	PCB EMC1	24x19x10	
0182-810-010	Chain incl. attachments		
0182-810-011	Potentiometer Z WS 10t 2kΩ		
0182-810-015	Button brake release Z WS	24x19x10	

Arcoma part no.	Part description	Dimensions (cm)	Weight (kg)
0182-810-017	Cable kit switches DH WS		
0182-810-039	Cover detector holder R		
0182-810-043	Cover detector holder L		
0200-810-780	Tape measure for AL02 collimator		
0500-810-001	BCM box cpl.		
0500-810-875	Cleaning/lubrication kit for column		
0512-810-012	Encoder Z WS	24x19x10	0.4
0512-810-408	Power supply SC		
0512-810-410	Frequency converter ATV12 CS		
0540-810-201	PCB CB800 SC	24x19x10	0.9
1105-810-110	X-ray tube A292 400 kHU (RAL 9003)	53x53x87	33
1105-810-113	X-ray tube RAD14 300 kHU (RAL 9003)	40x40x80	23
1105-810-114	X-ray tube G292 600 kHU (RAL 9003)	53x53x87	33
1105-810-200	Collimator AL02-2	52x52x45	13.1
1105-810-206	Collimator AL02-2 LED	52x52x45	13.1
1105-810-218	Collimator Ralco 302 LED w laser	52x52x45	11.0
1105-810-301	DAP chamber 90-301	30x25x10	0.8
1105-810-545	Light bulb for AL02 collimator	24x19x10	0.2
1105-810-805	AEC chamber, AID	60x52x9	2.5
1105-810-892	Laser for AL02 collimator	24x19x10	0.2

13 Waste Disposal

The Manufacturing company is responsible for disposal of the system.

To avoid environment pollution and human injury, we therefore request that you contact the Manufacturer or your dealer if you wish to cease operation of your system with the intention of disposal.

For disposal of other components, refer to corresponding documentation.

Follow the rules and regulations of your relevant authorities in the disposal of this system, accessories, options, consumables, media and their packing materials.

14 Appendix A

14.1 Glossary

A

Accessories	Extra facilities to the system which easily can be mounted by the user.
AEC	Automatic Exposure Control.
Alpha	A direction for a rotation movement.

B

Beta	A direction for a rotation movement. The tube turns around the Z-axis.
Btu/hr	British thermal unit/hour.
BU/Back-up	A precautionary measure that shuts off the exposure, if the AEC chamber does not.
Bucky	See Detector holder.

C

CE	A CE-marked product verifies that the Manufacturer guarantees that the product fulfils the EU fundamental health, environment and security requirements.
Centering	The field of image is centered over the detector.
Collision	Either a physical collision with an obstacle or the node cannot reach its end position.
CR	Image plates.

D

DAP meter	Dose Area Product meter. The DAP-meter is placed next to the collimator and measures the amount of X-ray radiation that leaves the collimator.
Diode	Electrical component that leads voltage and current in one direction.
Dealer	See “Supplier”.
Detector	Image receptor for X-ray that does not require a cassette. The reception and transfer of an image is digital.

E

EMC	Electromagnetic Compatibility.
End stop	See mechanical end stop and software end stop.
Exposure	An image is taken against an image receptor.

G

Guard function	Collision detection of the Z-movement (option).
Guard sensor	A sensor in the top of the Z-column that registers variations of force.

I

IEC	International Electrotechnical Commission.
Image receptor	Receptor for images: Film, CR, DR, or Cassette.
Image receptor holder	Holder for the image receptor (Film, CR, DR or Cassette).
Index	Mechanical position markings, for instance alpha 0°, +90° and -90°.
Intermittence	The number of repetitions / unit of time. Recurrent cycles.
ISO	International Organization for Standardization.

M

Mechanical end stop	A physical device that stops an automatic or manual movement if the software end stop is out of order.
Motorized movement	A motor assisted movement.

N

Node	A control and supervision unit, consists of printed circuit board and node specific software.

O

O.D.	Optic Density.
Options	Extra facilities that demand updating of the System software and hardware before use. Options demand installation of an authorized service technician.

P

Position	A location in the room (X, Y and Z).

S

SID	Source to image distance. The distance between the focus spot in the X-ray tube and the active image receptor surface. FFD is also used.
Software end stop	A non-physical device that stops an automatic or manual movement. The software end stop is placed before the mechanical end stop.
SSW	Service software.
Supplier	The company that sells the System to the user (hospital).

T

Table frame	The metallic frame that carries the Table top. The frame is attached to the bottom of the Table top.

W

Working area	The size of the Table top including X- and Y-stroke.

X

X-movement	The System moves in the X-direction.

Y

Y-movement	The System moves in the Y-direction.

Z

Z-node	The Z-node controls the Z-movement.
Z-movement	The System moves in the Z-direction.

15 Appendix B

15.1 Annual Maintenance Checklist

Make a copy of this paper before filling in.

If there is any discrepancy please use the table to make a note.

Hospital:..

Id no:..

Sign:..

15.1.1 System

- [ ] 1. Measure the system protective earth.
- [ ] 2. Check the emergency stops.

15.1.2 OTC

- [ ] 1. Check the tightening of bolts fixing the Y-rails to the Unistrut rails. Tightening torque 24 Nm. ______ (Nm)
- [ ] 2. Check the tightening of bolts fixing the X-rails distance plates (total 12 screws). Tightening torque 24 Nm. ______ (Nm)
- [ ] 3. Clean the side position wheels and check for damage.
- [ ] 4. Check the tightening of screws for the X-ray tube turning plate. Tightening torque 24 Nm. ______ (Nm)
- [ ] 5. Check the lifting cord for damage and make sure it runs smoothly.
- [ ] 6. Check the safety switch in the column.
- [ ] 7. Check the alignment of the X-ray and light field.
- [ ] 8. Check the alignment of the OTC.
- [ ] 9. Check the tube angulation.
- [ ] 10. Check the tightening of the four X-ray clamp screws. Tightening torque 24 Nm. ______ (Nm)
- [ ] 11. Check the X-ray tube for oil leakage.

- [ ] 12. Check that there is no play between the collimator and the X-ray tube.
- [ ] 13. Check the function of the column Z contactor.
- [ ] 14. Check the function of the manoeuvre handle buttons.
- [ ] 15. Check the function of the column Z brake.
- [ ] 16. Check the OTC column segments (full stroke).
- [ ] 17. Clean the wheel tracks.
- [ ] 18. Clean the wheels.
- [ ] 19. Check the fastening of the OTC column.
  Tightening torque 24 Nm. _______ (Nm)
- [ ] 20. Check the fastening of the OTC wagon side position wheel.
  Tightening torque 24 Nm. _______ (Nm)
- [ ] 21. Check the movement of the OTC to all positions in X-, Y- and Z-directions.

15.1.3 Closed table

- [ ] 1. Check the tightening of bolts fixing the table to the floor. Tightening torque 25 Nm. ______ (Nm)
- [ ] 2. Check the function and clean the table top ball bearings.
- [ ] 3. Clean the table top profiles.
- [ ] 4. Clean the profiles for the image receptor tray and detector wagon wheels.
- [ ] 5. Check the table top brake cabling.
- [ ] 6. Check the X-Y function of the table top brake. X:____ (Nm) Y:____ (Nm)
- [ ] 7. Check the internal Z movement cabling.
- [ ] 8. Check the status of the critical circlips.
- [ ] 9. Check the status of the sliding bearings.
- [ ] 10. Check the fastening of the mechanical stops of the lifting unit. Tightening torque 25 Nm. ______ (Nm)
- [ ] 11. Lubricate the Z-screw of the lifting unit.
- [ ] 12. Check for oil leakage from the lifting unit gearbox.
- [ ] 13. Check the Z function of the table.
- [ ] 14. Check the table guard function.
- [ ] 15. Check the foot and hand control X/Y/Z buttons.

15.1.4 Two column table (option)

- [ ] 1. Check the tightening of bolts fixing the table to the floor. Tightening torque 25 Nm. ______ (Nm)
- [ ] 2. Check the function and clean the table top ball bearings.
- [ ] 3. Clean the table top profiles.
- [ ] 4. Clean the profiles for the image receptor tray and detector wagon wheels.
- [ ] 5. Check the cabling to the table top brakes.
- [ ] 6. Check the condition of the table top brake pads.
- [ ] 7. Check the X-Y function of the table top brakes. X:____ (Nm) Y:____ (Nm)
- [ ] 8. Check the column segments on the table (full stroke).
- [ ] 9. Check the buttons on the foot control X/Y/Z.
- [ ] 10. Check the table guard function (option). ______ (Nm)

15.1.5 Wall stand

- [ ] 1. Check the tightening of bolts fixing the wall stand to the floor. Tightening torque 15 Nm. _______ (Nm)
- [ ] 2. Check the Z-chain attachment.
- [ ] 3. Check the Z movement.
- [ ] 4. Check the Z-mechanical end stops.
- [ ] 5. Check the function of the Z-brake. _______ (Nm)
- [ ] 6. Check the buttons on the foot control X/Y/Z.
- [ ] 7. Check the function of the detector tilt (option). _______ (Nm)

15.1.6 System part 2

- [ ] 1. Check the synchronization circuit.
- [ ] 2. Check the Z safety zone.
- [ ] 3. Check the positioning index of the OTC.
- [ ] 4. Check the table detector signals.
- [ ] 5. Check the wall stand detector signals.
- [ ] 6. Check the table SID.
- [ ] 7. Check the indication light and collimator light.
- [ ] 8. Check the function of the AEC chamber.
- [ ] 9. Verify the measured DAP value (Area dose:dGycm2).

Measured value: ______

Calculated value: ______

- [ ] 10. Clean all outer surfaces.
- [ ] 11. Disconnect the power plug and wipe off dust and dirt with a dry cloth.
- [ ] 12. Check all outer cables for damage.
- [ ] 13. Make sure that the Operation manual is present and up to date.

15.1.7 Remark

	Remark	Action	Internal note
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

16 Installation report

16.1 Attention

The installation report is an important form for Arcoma AB to receive feed-back from our dealers, in order to keep track of delivered systems and their current status. The report is required from all performed installations in order to comply with CFR 21 §1020.30.

The CE marking is fulfilled through MDR 2017/745 EU Annex IX where our Quality system is an essential part.

We kindly ask you to take the time needed to fulfil the report. The installation report form are delivered with each system (included in the Service and Installation Manual). There is also a digital form (this document) available which can be used.

Please send the fulfilled and signed report to service@arcoma.se. Sending the report confirms that you have installed the unit and that it is working properly on site.

If you encounter product related issues during the installation, it is important that we receive this information as input to our CAPA-process (Corrective and Preventive Action). For such reports please contact service@arcoma.se (+46 470 70 69 70).

Best regards, ARCOMA AB.

INFORMATION FROM THE DEALER

Product Identification

Equipment type:____________________

System Serial number:________________

Date:_____________________________

Dealer:___________________________ **Installer:** __________________________

Site Identification

Hospital/address:___________________

Department:_______________________ **Lab/room:**_________________________

☐ I hereby confirm that the installation is performed in accordance with this Installation and service manual.

Signature of Installer

Date ___________________ Signature ______________________________